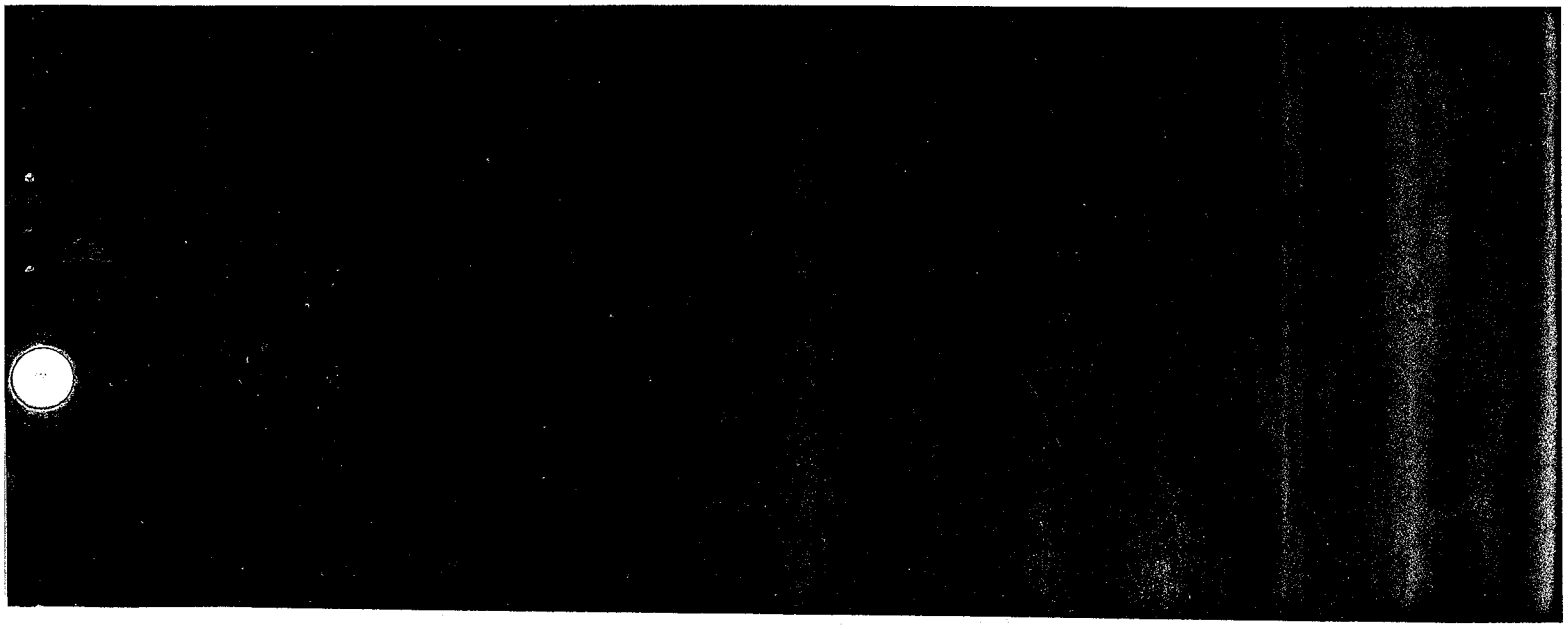
LG

External
Super Multi Rewriter
SERVICE MANUAL

MODEL: GSA-5120D/
GSA-5160D



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CAUTION - INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM.

SECTION I GENERAL

INTRODUCTION

This service manual provides a variety of service information.
It contains the mechanical structure of the External Super Multi DVD Rewriter and the electronic circuits in schematic form. This External Super Multi DVD Rewriter was manufactured and assembled under our strict quality control standards and meets or exceeds industry specifications and standards.

GENERAL FEATURES

1 General

1) Universa Serial Bus (USB) 2.0 and FireWire IEEE1394 interface for high-speed data transfer.
2) External Half-height drive
3) Buffer Under Run error protection technology
4) Emergency eject support
5) Bear media loading with power eject.
6) Combination of CD-R/RW, DVD-R/RW, DVD+R/RW, DVD+R DL(Double Layer) and DVD-RAM drive functions into one drive.
7) Supports region playback control Phase II.
8) 40X max Writing (CD-R), 24X max Writing (CD-RW), 16X max Writing (DVD+R)*, 8X max Writing (DVD-R), 5X max Writing (DVD-RAM), 4X max Writing (DVD+RW, DVD-RW), 2.4X Writing (DVD+R Double layer), 40X max Reading (CD-ROM, CD-R), 40X max Reading (CD-RW), 16X max Reading (DVD-ROM single), 8X max Reading (DVD-ROM dual), 10X max Reading (DVD+R, DVD-R), 8X max Reading (DVD+RW, DVD-RW, DVD-VIDEO), 5X Reading (DVD-RAM).

* DVD+R:16x max Writing (Model:GSA-5160D)
12x max Writing (Model:GSA-5120D)

2. Supported disc formats

1) Reads data in each DVD-ROM, DVD-R(Ver.1.0, Ver. 2.0 for Authoring) and DVD-RAM(Ver.1.0)
2) Reads and writes in each DVD-R(Ver. 2.0 for General), DVD-RW, DVD-RAM(Ver.2.1), DVD+R, DVD+R DL(Double Layer) and +RW
3) Reads data in each CD-ROM, CD-ROM XA, CD-I, Video CD, CD-Extra and CD-Text
4) Reads data in Photo CD (Single and Multi session)
5) Reads standard CD-DA
6) Reads and writes CD-R discs conforming to "Orange Book Part 2"
7) Reads and writes CD-RW discs conforming to "Orange Book Part 3"

3. Supported write method

1) DVD-R:.....Disc at Once and Incremental Recording
2) DVD-RW:.....Disc at Once, Incremental Recording and Restricted Overwrite
3) DVD-RAM:.....Random Write
4) DVD+R:.....Sequential Recording
5) DVD+R DL: .....Sequential Recording
6) DVD+RW:.....Random Write
7) CD-R/RW: .....Disc at Once, Session at Once, Track at Once and Packet Write

2.3 Disc diameter 120mm
80mm (Horizontal only)

2.4 Data capacity

- User Data/Block DVD-ROM/R/RW/RAM/+R/+RW ..... 2,048 bytes/block
  CD (Yellow Book) ..... 2,048 bytes/block(Mode 1 & Mode 2 Form 1)
  2,336 bytes/block (Mode 2)
  2,328 bytes/block (Mode 2 Form 2)
  2,352 bytes/block (CD-DA)

2.5 RPC (Regional Playback Control) Phase2, **No Region**

3. DRIVE PERFORMANCE

3.1 Host interface ..... USB 2.0
IEEE1394

3.2 Read/Write & Rotational speed

<Write>	DVD-R		2x, 4x (CLV), 8x (ZCLV)
	DVD-RW		1x, 2x, 4x (CLV)
	DVD-RAM	Ver. 2.1	2x, 3x (ZCLV), 3x-5x (PCAV)
	DVD+R		2.4x, 4x (CLV), 8x, 12x (ZCLV)
	DVD+R DL		2.4x CLV
	DVD+RW		2.4x, 4x (CLV)
	CD-R		4x, 8x, 16x (CLV), 24x, 32x, 40x (ZCLV)
	CD-RW		4x, 8x, 10x,16x (CLV), 24x (ZCLV) (High Speed: 8x, 10x, Ultra Speed: >16x)
<Read>	DVD-ROM	Single layer	6.7x - 16x (CAV), Approx. 9,420 r/min
		Dual layer	3.3x - 8x (CAV), Approx. 5,180 r/min
	DVD-Video (CSS)		3.3x - 8x (CAV)
	DVD-R	3.95GB	4.2x - 10x (CAV), Approx. 5,180 r/min
		4.7GB	4.2x - 10x (CAV), Approx. 5,890 r/min
	DVD-RW	4.7GB	3.3x - 8x (CAV), Approx. 4,720 r/min
	DVD-RAM	Ver. 1.0/ 2.1	2x/ 2x, 3x (ZCLV)* 3x-5x (PCAV)*
	DVD+R	4.7GB	4.2x - 10x (CAV), Approx. 5,890 r/min
	DVD+R DL	8.5GB	3.3x - 8x (CAV), Approx. 5,180 r/min
	DVD+RW	4.7GB	3.3x - 8x (CAV), Approx. 4,720 r/min
	CD-R/ROM, CD-I / Video	(1.2m/s)	17x - 40x (CAV), Approx. 8,100 r/min
	CD-RW	(1.2m/s)	17x - 40x (CAV), Approx. 8,100 r/min
	CD-DA (DAE)	(1.2m/s)	17x - 40x (CAV), Approx. 8,100 r/min
	CD-DA (Audio out)	(1.2m/s)	4.0x - 10x (CAV), Approx. 2,030 r/min

* Rotational speed (CLV, ZCLV)

DVD-R/RW/ROM, +R/RW		1x: Approx. 1,390(Inside) - 580 r/min(Outside)
DVD-RAM	Ver. 1.0	1x: Approx. 2,390(Inside) - 1,010 r/min(Outside)
	Ver. 2.1	2x: Approx. 3,250(Inside) - 1,380 r/min(Outside)
CD-R/RW/ROM		1x: Approx. 500(Inside) - 210 r/min(Outside)

3.3 Data transfer rate

3.3.1 Sustained transfer rate

<Write> DVD-R .....2x, 4x, 8x ZCLV .....2.77, 5.54, 5.44-11.08 Mbytes/s
DVD-RW .....1x, 2x, 4x CLV .....1.385, 2.77, 5.54 Mbytes/s
DVD-RAM (Ver. 2.1): ..2x, 3x ZCLV, 3-5xPCAV ...2.77, 4.155,4155-6.925 Mbytes/s (w/o Verify)
DVD+R .....2.4x, 4x CLV 8x, 12xZCLV ...3.32, 5.54 5.54-11.08 8.31-16.62 Mbytes/s
DVD+R DL .....2.4x CLV .....3.32 Mbytes/s
DVD+RW.....2.4x, 4x CLV .....3.32, 5.54 Mbytes/s
CD-R .....4x, 8x, 16x CLV 24x, 32x, 40xZCLV
600, 1,200, 2,400, 2,400-3,600, 2,400-4,800, 2,400-6,000 kB/s (Mode-1)
CD-RW.....4x, 8x, 10x, 16x CLV, 24xZCLV
600, 1,200, 1500, 2,400, 2,400- 3,600 kB/s (Mode-1)

<Read> DVD-ROM .....Single layer.....9.28 - 22.16 Mbytes/s .....16x max.
Dual layer .....4.58 - 11.08 Mbytes/s .....8x max.
DVD-R .....5.73 - 13.85Mbytes/s.....10x max.
DVD-RW .....4.58 - 11.08 Mbytes/s .....8x max.
DVD-RAM .....Ver. 1.0 .....2.77 Mbytes/s .....2x ZCLV
Ver. 2.1 .....2.77, 4.155,4.155-6.93 Mbytes/s ..2x, 3x ZCLV, 3-5xPCAV
DVD+R .....5.73 - 13.85Mbytes/s.....10x max.
DVD+R DL .....4.58 - 11.08 Mbytes/s.....8x max.
DVD+RW.....4.58 - 11.08 Mbytes/s .....8x max.
CD-R/ROM.....2,550 - 6,000 kB/s.....40x max.
CD-RW..... .....2,550 - 6,000 kB/s.....40x max.
CD-DA (DAE) .....2,550 - 6,000 kB/s.....40x max.

3.4 Access time (1/3 stroke)

DVD-ROM.....145 ms Typ. (Note 1)
DVD-RAM (Ver.2.1).....165 ms Typ.
CD-ROM .....125ms Typ. (Note 1)

Note :

1) Average access time is the typcal value of more than 50 times including latency and error correction time.

Test Disc : DVD : ALMEDIO TDV-520 / TDR-820

CD : ALMEDIO TCDR-701 / HITACH HCD-1

**) Typical value defines a measured value in normal temperature (20 deg.C.) and horizontal position.*

3.5 Data error rate (Measured with 5 retries maximum)

DVD-R/RW/ROM/RAM .....$<10^{-12}$
DVD-+R/+RW.....$<10^{-12}$
CD-R/RW/ROM.....$<10^{-12}$ (Mode-1)
$<10^{-9}$ (Mode-2)

Condition : It is assumed that the worst case raw error rate of the disc is 10^{-3}

3.6 Data buffer capacity 2Mbytes

4. Quality and Reliability

4.1 MTBF.....100,000 Power On Hours(Consecutive/Cumulative POH)
Assumption : .....Used in a normall office environment at room temperature.
-POH per year.....3,000
-ON/OFF cycles per year.....600
-Operating duty cycle.....20% of power on time (Seek: 5% of operating time)
4.2 Tray cycle test.....30,000 times
No degeneration in the mechanical part after test
4.3 Actuator mechanism.....1,000,000 full stroke seek
4.4 MTTR (Mean Time To Repair) .....0.5 h
4.5 Component life .....5 years or 2,000 h of Laser radiating time
Assumption : .....Used in a normall office environment.

5. POWER REQUIREMENTS

5.1 Power Requirements AC Adaptor
INPUT : 100-240V AC, 50/60Hz
OUTPUT : 5V/12V 1.5A

6. AUDIO PERFORMANCE

Output Level (1kHz, 0dB) .....0.7Vrms typical
Frequency Response .....+/-3dB (20 to 20,000Hz)

* **Which is not provided with Circuit Diagram of this model. Please Contact the friendly staff of LG Service Care at: Website http: //www.LGEservice.com**

SPECIFICATIONS

II. MODEL : GSA-5160D

1. SYSTEM REQUIREMENTS

-CPU: IBM Compatible Pentium4 2.8GHz (or faster)
-128MB Memory or greater

2. SUPPORTING OPERATING SYSTEM

* ***Operating System***
  Window 2000 Professional
  Window XP Home Edition, Professional

* **Recording tool**
  (1) Nero(Ahead)
  (2) In CD(Ahead)
  (3) Power Producer Gold (Cyber Link)

2.1 Applicable disc formats

DVD	DVD-ROM:	4.7GB (Single Layer)
		8.5GB (Dual Layer)
	DVD-R:	3.95GB (Ver.1.0 : read only)
		4.7GB (Ver.2.0 for Authoring : read only)
		4.7GB (Ver.2.0 for General: read & write)
	DVD-RW:	4.7GB (Ver.1.1)
	DVD-RAM:	2.6GB/side (Ver.1.0)
		1.46GB/side, 4.7GB/side (Ver.2.2)
	DVD+R:	4.7GB
	DVD+R DL:	8.5GB
	DVD+RW:	4.7GB

CD.....CD-ROM Mode-1 data disc
CD-ROM Mode-2 data disc
CD-ROM XA, CD-I, Photo-CD Multi-Session, Video CD
CD-Audio Disc
Mixed mode CD-ROM disc (data and audio)
CD-Extra
CD-Text
CD-R (Conforming to "Orange Book Part2": read & write)
CD-RW (Conforming to "Orange Book Part3": read & write)

2.2 Writing method

(1) DVD-R/RW	Disc at Once
	Incremental Recording
	Restricted Overwrite (DVD-RW only)
(2) DVD-RAM/+RW	Random Write
(3) DVD+R	Sequential Recording
(4) DVD+R DL	Sequential Recording
(5) CD-R/RW	Disc at Once (DAO)
	Session at Once (SAO)
	Track at Once (TAO)
	Packet Write

2.3 Disc diameter 120mm
80mm (Horizontal only)

2.4 Data capacity

- User Data/Block DVD-ROM/R/RW/RAM/+R/+RW ..... 2,048 bytes/block
  CD (Yellow Book) ..... 2,048 bytes/block(Mode 1 & Mode 2 Form 1)
  2,336 bytes/block (Mode 2)
  2,328 bytes/block (Mode 2 Form 2)
  2,352 bytes/block (CD-DA)

2.5 RPC (Regional Playback Control) Phase2, **No Region**

3. DRIVE PERFORMANCE

3.1 Host interface ..... USB 2.0
IEEE1394

3.2 Read/Write & Rotational speed

<Write>	DVD-R		2x, 4x (CLV), 8x (ZCLV)	
	DVD-RW		1x, 2x, 4x (CLV)	
	DVD-RAM	Ver. 2.2	2x, 3x (ZCLV), 3x-5x (PCAV)	
	DVD+R		2.4x, 4x (CLV), 8x, 16x (ZCLV)	
	DVD+R DL		2.4x CLV	
	DVD+RW		2.4x, 4x (CLV)	
	CD-R		4x, 8x, 16x (CLV), 24x, 32x, 40x (ZCLV)	
	CD-RW		4x, 8x, 10x,16x (CLV), 24x (ZCLV) (High Speed: 8x, 10x, Ultra Speed: >16x,24x)	
<Read>	DVD-ROM	Single layer	6.7x - 16x (CAV),	Approx. 9,420 r/min
		Dual layer	3.3x - 8x (CAV),	Approx. 5,180 r/min
	DVD-Video (CSS)		3.3x - 8x (CAV)	
	DVD-R	3.95GB	4.2x - 10x (CAV),	Approx. 5,180 r/min
		4.7GB	4.2x - 10x (CAV),	Approx. 5,890 r/min
	DVD-RW	4.7GB	3.3x - 8x (CAV),	Approx. 4,720 r/min
	DVD-RAM	Ver. 1.0/ 2.2	2x/ 2x, 3x (ZCLV)*	3x-5x (PCAV)*
	DVD+R	4.7GB	4.2x - 10x (CAV),	Approx. 5,890 r/min
	DVD+R DL	8.5GB	3.3x - 8x (CAV),	Approx. 5,180 r/min
	DVD+RW	4.7GB	3.3x - 8x (CAV),	Approx. 4,720 r/min
	CD-R/ROM, CD-I / Video	(1.2m/s)	17x - 40x (CAV),	Approx. 8,100 r/min
	CD-RW	(1.2m/s)	17x - 40x (CAV),	Approx. 8,100 r/min
	CD-DA (DAE)	(1.2m/s)	17x - 40x (CAV),	Approx. 8,100 r/min
	CD-DA (Audio out)	(1.2m/s)	4.0x - 10x (CAV),	Approx. 2,030 r/min

* Rotational speed (CLV, ZCLV)

DVD-R/RW/ROM, +R/RW		1x: Approx. 1,390(Inside) - 580 r/min(Outside)
DVD-RAM	Ver. 1.0	1x: Approx. 2,390(Inside) - 1,010 r/min(Outside)
	Ver. 2.2	2x: Approx. 3,250(Inside) - 1,380 r/min(Outside)
CD-R/RW/ROM		1x: Approx. 500(Inside) - 210 r/min(Outside)

3.3 Data transfer rate

3.3.1 Sustained transfer rate

<Write> DVD-R.....2x, 4x, 8x ZCLV.....2.77, 5.54, 5.44-11.08 Mbytes/s
DVD-RW .....1x, 2x, 4x CLV.....1.385, 2.77, 5.54 Mbytes/s
DVD-RAM (Ver. 2.2): ..2x, 3x ZCLV, 3-5xPCAV...2.77, 4.155,4155-6.925 Mbytes/s (w/o Verify)
DVD+R.....2.4x, 4x CLV 8x, 16xZCLV ...3.32, 5.54 5.54-11.08 9.28-22.16 Mbytes/s
DVD+R DL .....2.4x CLV.....3.32 Mbytes/s
DVD+RW.....2.4x, 4x CLV.....3.32, 5.54 Mbytes/s
CD-R .....4x, 8x, 16x CLV 24x, 32x, 40xZCLV
600, 1,200, 2,400, 2,400-3,600, 2,400-4,800, 2,400-6,000 kB/s (Mode-1)
CD-RW.....4x, 8x, 10x, 16x CLV, 24xZCLV
600, 1,200, 1500, 2,400, 2,400- 3,600 kB/s (Mode-1)

<Read> DVD-ROM.....Single layer.....9.28 - 22.16 Mbytes/s .....16x max.
Dual layer .....4.58 - 11.08 Mbytes/s .....8x max.
DVD-R.....5.73 - 13.85Mbytes/s.....10x max.
DVD-RW .....4.58 - 11.08 Mbytes/s .....8x max.
DVD-RAM .....Ver. 1.0.....2.77 Mbytes/s .....2x ZCLV
Ver. 2.2.....2.77, 4.155,4.155-6.93 Mbytes/s ..2x, 3x ZCLV, 3-5xPCAV
DVD+R.....5.73 - 13.85Mbytes/s.....10x max.
DVD+R DL .....4.58 - 11.08 Mbytes/s.....8x max.
DVD+RW.....4.58 - 11.08 Mbytes/s .....8x max.
CD-R/ROM.....2,550 - 6,000 kB/s.....40x max.
CD-RW..... .....2,550 - 6,000 kB/s.....40x max.
CD-DA (DAE) .....2,550 - 6,000 kB/s.....40x max.

3.4 Access time (1/3 stroke)

DVD-ROM.....145 ms Typ. (Note 1)
DVD-RAM (Ver.2.2).....165 ms Typ.
CD-ROM.....125ms Typ. (Note 1)

Note :

1) Average randomaccess time is the typcal value of more than 50 times including latency and error correction time.

Test Disc : DVD : ALMEDIO TDV-520 / TDR-820

CD : ALMEDIO TCDR-701 / HITACH HCD-1

**) Typical value defines a measured value in normal temperature (20 deg.C.) and horizontal position.*

3.5 Data error rate (Measured with 5 retries maximum)

DVD-R/RW/ROM/RAM .....$<10^{-12}$
DVD-+R/+RW.....$<10^{-12}$
CD-R/RW/ROM.....$<10^{-12}$ (Mode-1)
$<10^{-9}$ (Mode-2)

Condition : It is assumed that the worst case raw error rate of the disc is 10^{-3}

3.6 Data buffer capacity 2Mbytes

4. Quality and Reliability

4.1 MTBF.....100,000 Power On Hours(Consecutive/Cumulative POH)
Assumption : .....Used in a normall office environment at room temperature.
-POH per year.....3,000
-ON/OFF cycles per year.....600
-Operating duty cycle.....20% of power on time (Seek: 5% of operating time)
4.2 Tray cycle test.....30,000 times
No degeneration in the mechanical part after test
4.3 Actuator mechanism .....1,000,000 full stroke seek
4.4 MTTR (Mean Time To Repair) .....0.5 h
4.5 Component life .....5 years or 2,000 h of Laser radiating time
Assumption : .....Used in a normall office environment.

5. POWER REQUIREMENTS

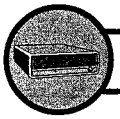
5.1 Power Requirements AC ADAPTOR
INPUT : 100-240V AC, 50/60Hz
OUTPUT : 5V/12V 1.5A

6. AUDIO PERFORMANCE

Output Level (1kHz, 0dB) .....0.7Vrms typical
Frequency Response .....+/-3dB (20 to 20,000Hz)

* **Which is not provided with Circuit Diagram of this model. Please Contact the friendly staff of LG Service Care at: Website http: //www.LGEservice.com**

OPERATING MANUAL



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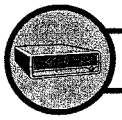
WARNING: Only drives bearing the logo Compact Disc ReWritable Ultra Speed can write or erase Ultra Speed CD-RW media.

Ultra Speed CD-RW Media may be recognized by the same Compact Disc ReWritable.
Ultra Speed logo on the disc label or packaging material.

Attempting to write to Ultra Speed CD-RW media using CD-RW drives NOT bearing the logo Compact Disc ReWritable Ultra Speed may result in data loss.

DVD+R Double Layer media may have compatibility problem with other drives.



Introduction

Cautions

System meeting the following requirements is needed in order to use USB 2.0 operation with this drive.

- Computer that is equipped with a USB 2.0 – compliant USB connector or PCI adapter card, and on which the USB 2.0 EHCI (Enhanced Host Controller Interface) driver software [1] has been installed.

  [1] The USB 2.0 EHCI driver software is supplied with currently available PCI adapter cards that conform to USB 2.0. Further, Microsoft has released the USB 2.0 EHCI driver software for Windows XP, therefore it is also possible to use this driver software with Windows XP.
  If you want to know in detail, please contact your USB 2.0 adapter dealer or consult your PC manufacturer, or consult the Microsoft Corporation Web site.

- To achieve maximum Record & Write speed your system may require data to be copied first to the computer's hard drive rather than directly from another source disc or drive.

System requirements

Computer

This unit can be operated in the system environment explained here.

System requirements	CPU	Pentium 4 2.8GHz or Higher with IBM PC or Compatible.
	Memory	512MB of RAM or greater.
Hard disk		10GB or more free space. (The free space needed for writing depends on the quantity of data.)
Interface		USB port or IEEE1394 port
CD-ROM drive		For Software installation
Software Required OS		Windows 2000 Professional/XP(Home Edition/ Professional), Direct X 9.0 or Higher is required.
CD-R, CD-RW, DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM discs		**CD-R** : LG, Mitsubishi Chemical, Verbatim, Taiyo Yuden, TDK or SKC discs are recommended. **CD-RW** : LG, Ricoh, Mitsubishi Chemical, Verbatim discs are recommended. **DVD-R** : Maxell, Taiyo Yuden, JVC are recommended. **DVD-RW** : JVC, Mitsubishi Chemical, TDK are recommended. **DVD+R** : Mitsubishi Chemical, Verbatim are recommended. **DVD+RW** : TDK, FujiFilm, Ricoh are recommended. **DVD-RAM** : Maxell, Panasonic are recommended. **DVD+R DL** : Mitsubishi Chemical is recommended.

* Compatibility problem in write/read function may occur with some DVD+R Double Layer media depending on the media manufacturing quality.

Important precautions

Follow these precautions when handling the drive or discs.

Precautions

Please note that the manufacturer of this equipment does not offer any warranty against data loss due to inappropriate installation, handling, direct or indirect damages. Please note that the manufacturer will bear no responsibility for direct or indirect damages (including lost data)caused by the use of this product or its malfunction.

Please backup(copy) all important data as protection against data loss.

Installation

Avoid placing the drive in a location subject to:

- high humidity
- high temperature
- excessive dust
- mechanical vibration
- direct sunlight

Operation

Don't move the drive suddenly from a cold place to warm one.
Condensation may cause abnormal operation.
Make sure to remove the disc before moving the drive to prevent the possible damage to the disc.
Prevent foreign objects, such as liquids or metal, from entering the drive and in the case a foreign object enters the drive, please consult the dealer where the drive was purchased.
Don't interrupt the electric power while the drive is operating.
While drive is operating, don't move the drive or give a shock to the drive, since it can cause damages to the disc.

AC Adapter

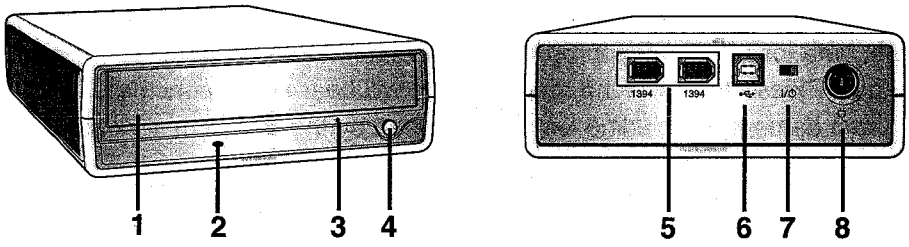
Don't plug in or remove the AC adapter using wet hands.
Don't damage the AC adapter by scratching, modifying, or bending its prongs.
Use only supplied AC adapter.
Don't disassemble the AC adapter.

Operation through a USB hub cannot be guaranteed.

When connecting with USB1.1 interface, picture and sound may be disrupted while watching DVD Video due to lack of data transfer speed.
For smoother playback of DVDs, high-speed USB 2.0 should be used.

Location and function of controls

This dr iv e should be used only in its current hardware and softw are configur ation.



1. **Disc Tray**
2. **Drive activity indicators**

   The LED used to indicate the operation of External Super Multi DVD Rewriter.

   Read:

   The green color is displayed during disc reading session.

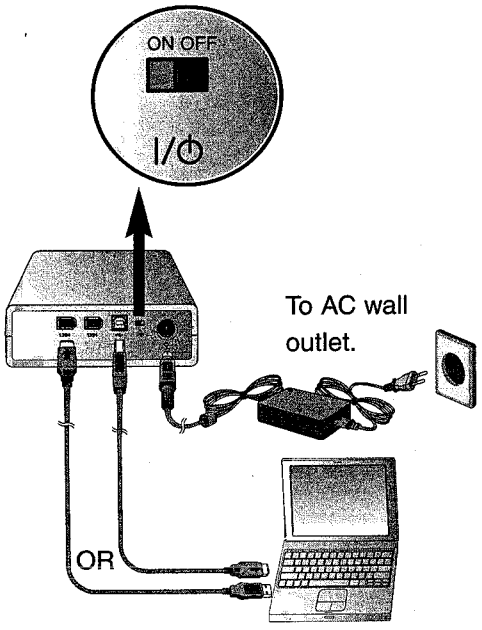
   Write:

   The green color is flashed during disc writing sessions. (CD-R/RW, DVD-R/RW)

   The green color is displayed during disc writing session. (DVD-RAM, DVD-R/RW)
3. **Emergency Eject Hole**
4. **Stop/Eject Button**
5. **1394 Connector (6 pin) -**This connector is used to connect to the 1394 FireWire.
6. **USB Connector -** This connector is used to connect to the USB converter cable.
7. **Power Switch -** Use this switch to turn the drive on and off.
8. **Power Connector -** This connector is used to connect to the AC Power adapter cord.

Hardware Installation

Connecting to computer



NOTES

- Make sure you have a personal computer with an open USB port or IEEE 1394 port before connecting the drive to your computer.
- You cannot use the FireWire [IEEE 1394] and USB interfaces simultaneously.
- Power for all device should be turn off before attaching the cables.

Connect the drive to the computer as shown in figure.

1. Connect the USB converter cable [or IEEE 1394 cable] to the External Super Multi DVD Rewriter.
2. Connect the other end of the USB converter cable [or IEEE 1394 cable] to your computer.
3. Connect the AC adapter plug to the power connector at the rear of the drive.
   Attach the AC adapter to the AC wall outlet.
4. When the computer is ready, confirm that the drive is detected. And then, insert the supplied software CD into the External Super Multi DVD Rewriter and install the software.

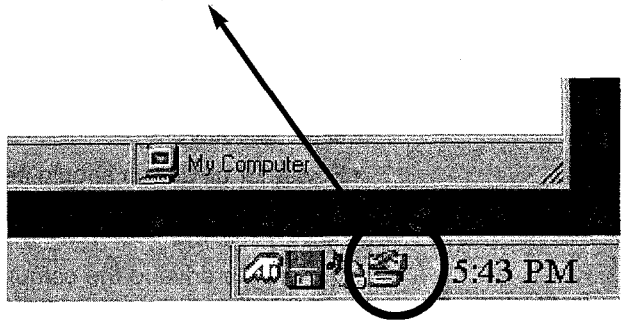
NOTES

- Please do not turn off the drive while the computer is searching for the drive.
  If you turn off the drive, normal operation of the computer will not be possible.
- Please do not connect the AC adapter and USB 2.0 converter cable by any means other than specified above.

Removing the USB converter cable

The drive supports the plug and play(not swap) function of Windows, and can be removed and inserted by performing the following operation.

1. Stop the application softwre being currently used.
2. Click the icon " " of the taskbar located on your screen's bottom right side .



3. Click "Safely Remove USB Mass Storage Device-Drive[x:]".
4. Click "Ok" and then remove the USB converter cable.

NOTE

Don't remove the USB convter cable when the busy indicator on the drive blinks, or during computer startup.

Operation

Loading and ejecting a disc

Remember - AC adapter must be connected.
Make sure the power is turned on.

Loading a disc

1. Push the Eject Button to open the Disc tray.
2. Load a disc. (Label facing up.)
3. Close the Disc tray.

Ejecting a disc

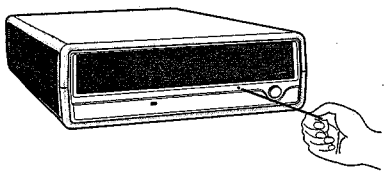
1. Push the Eject Button to open the Disc tray.
2. Removing the disc.
3. Close the Disc tray after removing the disc.

Emergency Eject

This drive has a feature that allows the CD to be ejected manually in case of a drive failure or a power outage.

NOTE: Don't use this feature **except** in an emergency.

1) Turn the power OFF.
2) Poke a fine-tipped object (such as a straightened heavy duty paper clip) into the small hole above the eject button. The front door will pop open and the disk tray will come partway out.
3) Pull the front door to open it all the way, then grip the disc tray between thumb and forefinger and gently pull it straight out.



NOTE: Use this feature for an ermergency purpose only. Using it excessively will cause malfunction.

* If you cannot get a good grip on the disc tray with your fingers, use a steel binder clip or spring clamp to pull it out.

Playing a music CD

Listening to sound

When connected to a computer, you can play audio CD's through your computer's audio system after setting Digital Audio mode.

Check your Windows or "Windows Media Player" manual for detail.

Playing DVD video and MPEG2 movie video

The drive must be connected to a computer, and basic installation already done. Install the 'PowerDVD' software to your PC.
Inserting the disc will automatically start installation. Follow the wizard.
After installation, remove the PowerDVD software and put it away for safekeeping.
Inserting a DVD Video disc into the drive and it will play automatically.

NOTES

- **DVD video region code:**
  Each region around the world has a different region number on the DVD video movies being sold in a region.
  The region code can be changed to other regions up to 5 times by using the software decoder (PowerDVD).
  If you change the region code 5 times, the drive will lock onto the last (5th change) region code, and cannot change the drive to another region code.
  This limitation is a requirement as licensees of DVD drive technology.
- **When connecting with USB1.1 interface, due to it's slow transfer time, picture and sound may be disrupted when trying to view a DVD movie.**

Appendix

Troubleshooting

If you are experiencing problems with the drive, verify the following items. Since the problem may be caused by a device other than the drive, check other things such as system settings or other software being used, etc.
If you cannot resolve the problem after verifying these items, contact your dealer or our customer service department.

Problem	Possible Cause	Possible Solution
Cannot play a DVD or CD in the drive or certain types of discs cannot be read in the drive.	1. The disc is not inserted correctly. 2. The disc is dirty. 3. The pick-up lens is dirty. 4. The disc is scratched or warped. 5. The disc uses a region code that cannot be played on the drive.	1. Reinsert the disc correctly. 2. Clean the disc surface. 3. Clean the pick-up lens. 4. Change the disc. 5. Refer to your system manual for help.
Disc tray cannot be opened	1. AC Plug is not connected to AC outlet. 2. Power Switch is not turned on.	1. Connect the AC plug tightly. 2. Turn the Power Switch on and try again.
Drive is not detected by the system.	1. The USB 2.0 converter cable is not properly connected. 2. Power Switch is not turned on.	1.Make sure USB 2.0 converter cable is connected properly and re-install the device driver. 2. Turn the Power Switch on and try again.
Drive will not play media or certain types of CD or DVD media	1. The disc doesn't match your system. Is the media disc the correct format for the type of system that you are using. 2. Virus possibility.	1. Check the disc format. (on a PC an ISO 9660 IBM compatible PC format as opposed to Apple/Mac HFS disc or UNIX disc formats will not function) 2. Has the Windows DVD-ROM software driver program been corrupted by a virus? Run a Virus Scan program and repair if possible.

DISASSEMBLY

1. TOP COVER

A. Remove 6 side rubbers and release 8 screws(A).
B. And then, remove 2 side panels and Top cover in the direction of arrow(1).(see Fig.1-1)

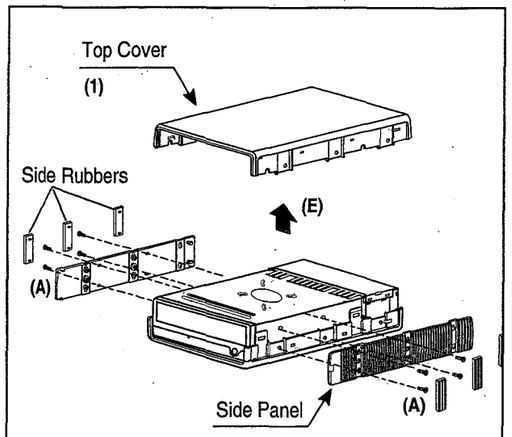


Fig. 1-1

2. INTETNAL DVD MULTI DRIVE

A. Remove the internal DVD Multi drive in the direction of arrow(2). (See Fig.1-2)

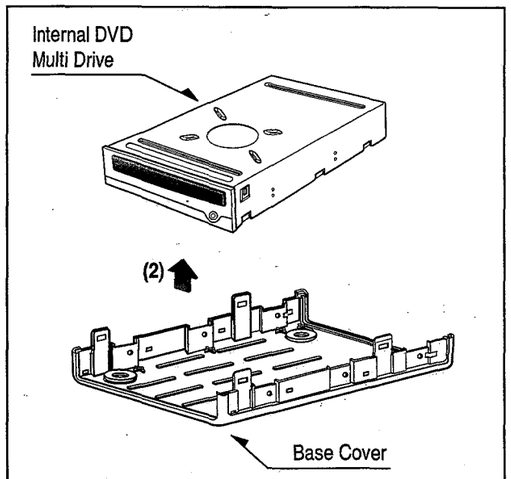


Fig. 1-2

3. USB/1394 BRIDGE BOARD

A. Remove Top Shield and Plate Assembly.
B. Release 4 screws(B) and remove the USB/1394 bridge board in the direction of arrow(3).(See Fig. 1-3)

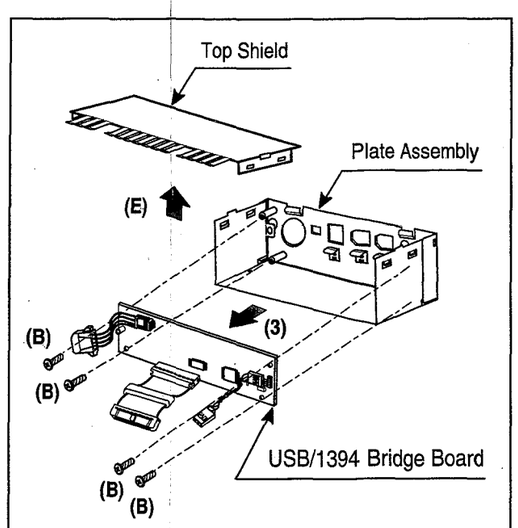
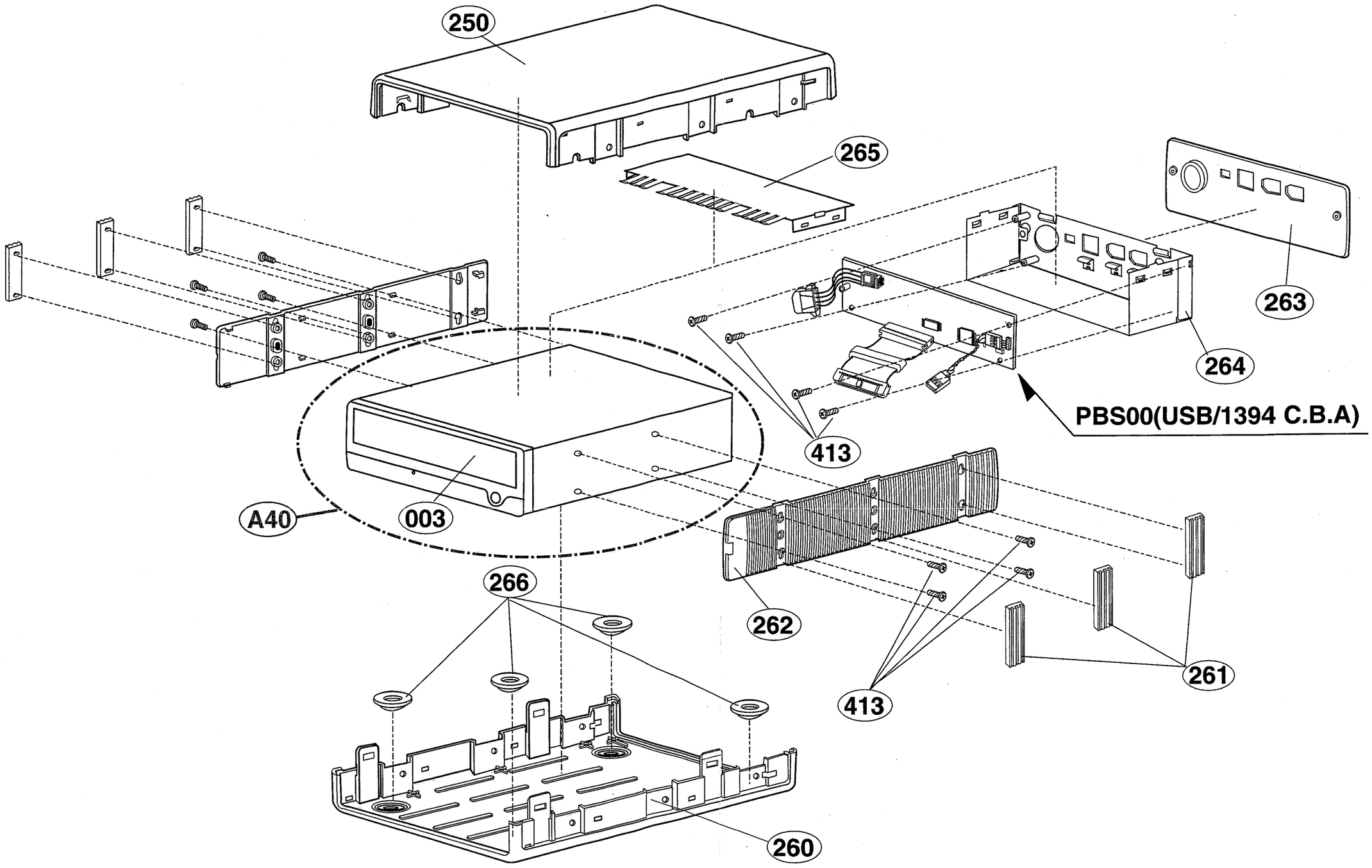


Fig. 1-3

EXPLODED VIEW



5
4
3
2
1

A B C D E F G H

23 24

MECHANICAL REPLACEMENT PARTS LIST

• MODEL: GSA-5120D

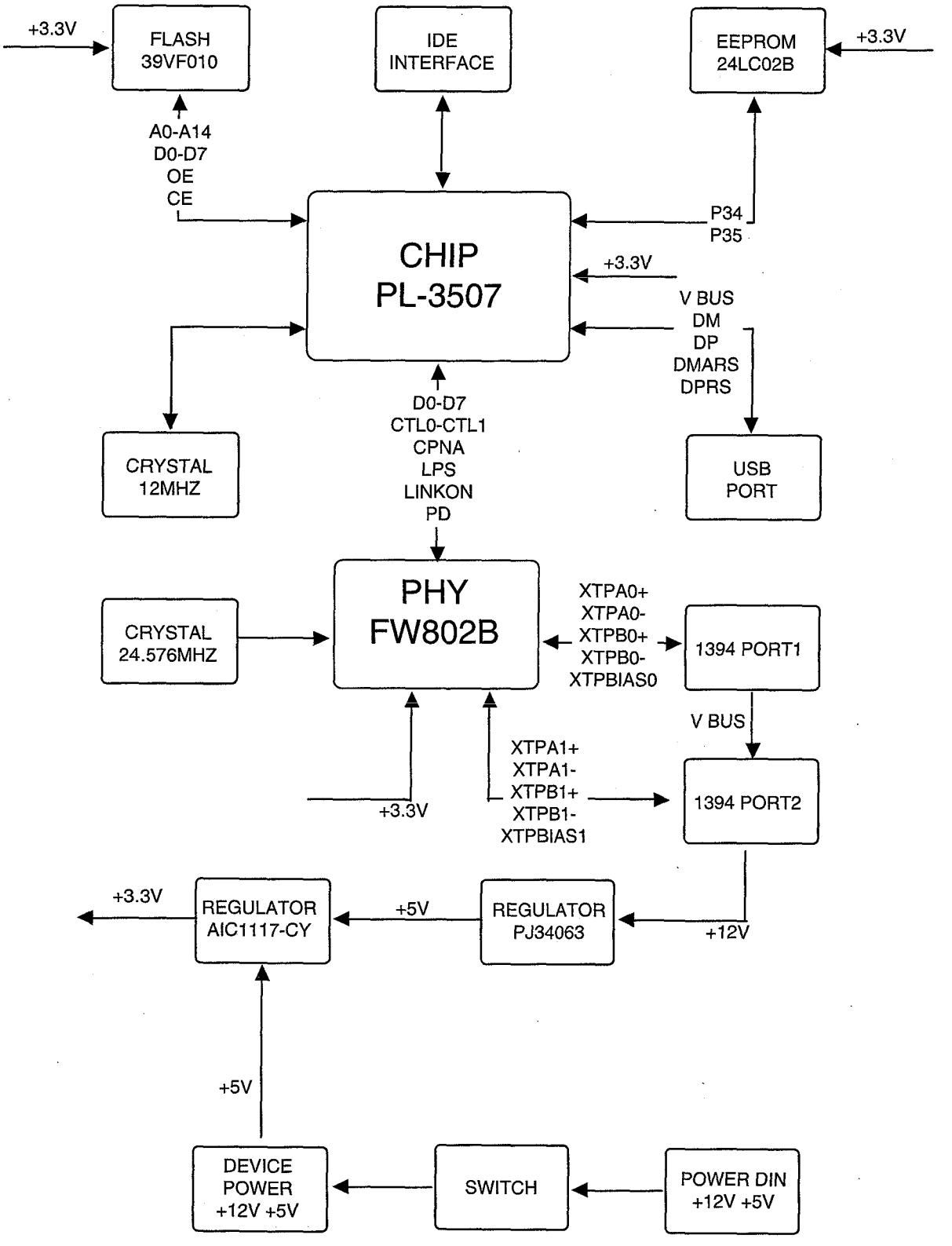
LOCA.NO	PART NO(GS)	DESCRIPTION	SPECIFICATION	REMARKS
ASSEMBLE PARTS SECTION				
A40	6779H-1006B	DVD MULTI DRIVER ASSY	JRP1 GSA-5120D	
PARTS SECTION				
250	3550H-1110A	COVER	TOP(JRP1) GSA-5120D WHITE	
260	3551H-1031A	COVER ASSEMBLY	BOTTOM(JRP1) GSA-5210D	
261	5240H-1100A	RUBBER	SIDE HOOT(JRP1)	
262	3550H-1112A	COVER	SIDE PANEL(JRP1)	
263	3550H-1113A	COVER	BACK PANEL(JRP1)	
264	3301H-1017A	PLATE ASSEMBLY	BOTTOM SHIELD(JRP1)	
265	3300H-1242A	PLATE	TOP SHIELD(JRP1)	
266	5240H-1101A	RUBBER	BOTTOM HOOT(JRP1)	
PBS00	6871H-3601A	PWB(PCB) ASSEMBLY	USB2.0/1394 BRIDGE BOARD	
003	3061H-1145A	BEZEL ASSEMBLEY	SILVER(JRP1)	
SCREW				
413	IMPC032418	SCREW, PAN HEAD MACHINE	D3.0 L8.0 MSWR3/FZY	
Note: Refer to DVD MULTI DRIVER ASSY REPLACEMENT PARTS LIST in order to look for the part number of A40.				
MISCELLANEOUS PARTS				
801	3828HM1056A	MANUAL, OWNERS	EXTERNAL DRIVE(GSA-5120D)	
802	3828HN1007G	MANUAL,INSTALLATION	QUICK GUIDE FOR SOFTWARE	
805	3890H-1807A	BOX	GIFT GSA-5120D LG(W/W)	
806	3890H-1808A	BOX	SHIPPING GSA-5120D LG(W/W)	
807	3920H-1109A	PACKING	CUSHION(GSA-5120D)	
808	3920H-1113A	PACKING	PLASTIC HANDLE FOR BOX	
810	6851HC3003A	CABLE ASSEMBLY	029-500027 DOTOP FT UL2651#28	
811	6851HU7002A	CABLE ASSEMBLY	U00088 DOTOP USB USB	
811	6851HU7002B	CABLE ASSEMBLY	FZ10-04-0740 AMP USB USB	
812	6851HUB001A	CABLE ASSEMBLY	E00014 DOTOP USB IEEE1394	
812	6851HUB001B	CABLE ASSEMBLY	FZ10-04-0742 AMP USB IEEE1394	
813	6851HUC001A	CABLE ASSEMBLY	E00017 DOTOP USB IEEE1394	
813	6851HUC001B	CABLE ASSEMBLY	FZ10-04-0741 AMP USB IEEE1394	

MECHANICAL REPLACEMENT PARTS LIST

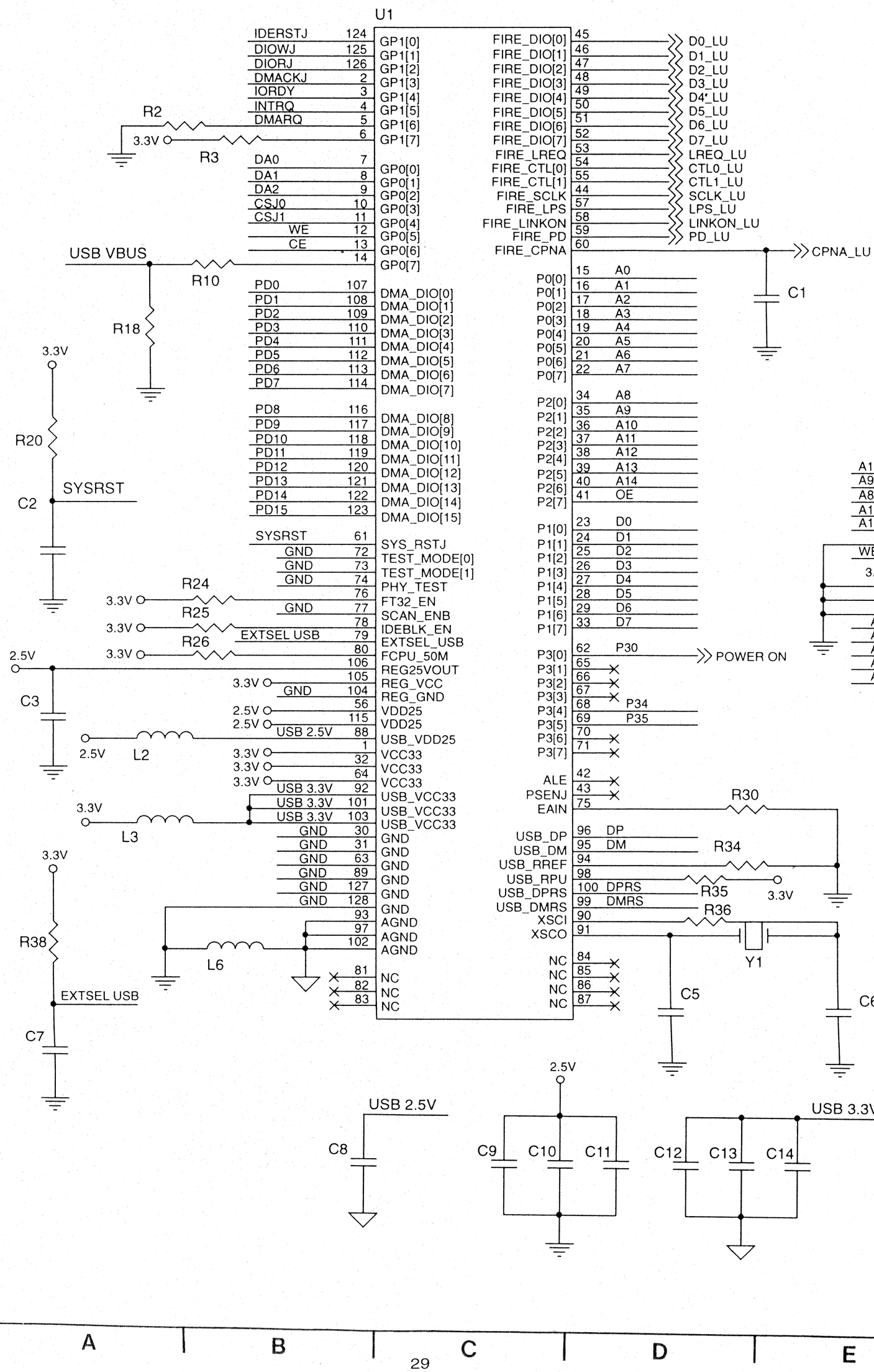
• MODEL: GSA-5160D

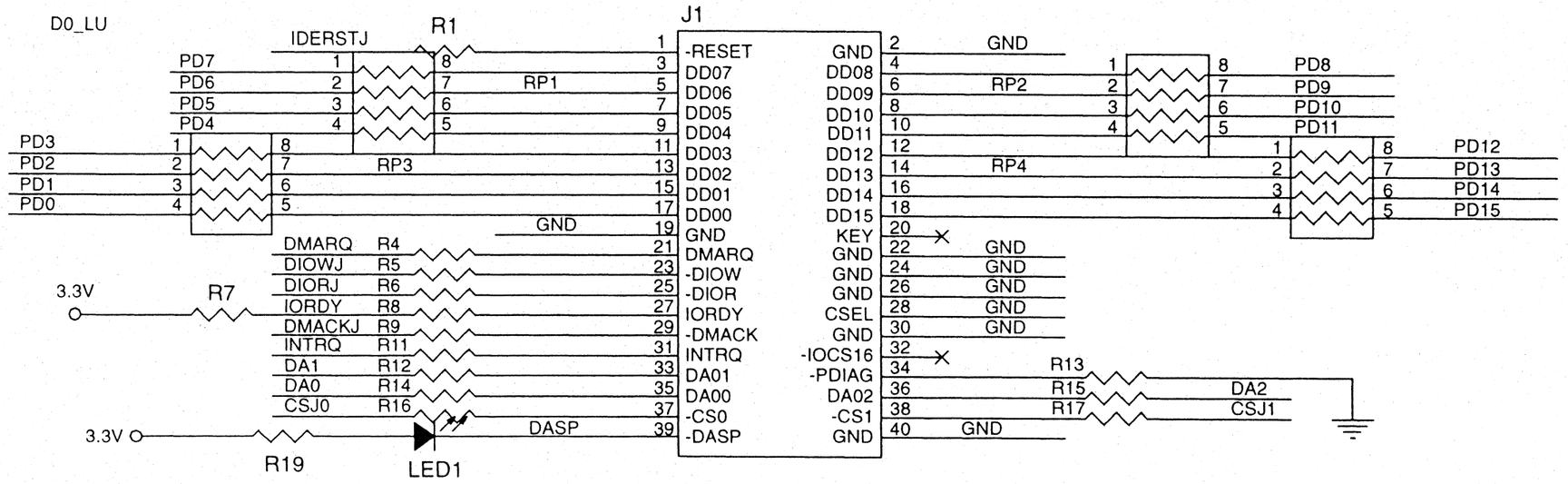
LOCA.NO	PART NO(GS)	DESCRIPTION	SPECIFICATION	REMARKS
ASSEMBLE PARTS SECTION				
A40	6779H-1018B	DVD MULTI DRIVER ASSY	JRP1 GSA-5160D	
PARTS SECTION				
250	3550H-1110A	COVER	TOP(JRP1) GSA-5120D WHITE	
260	3551H-1031A	COVER ASSEMBLY	BOTTOM(JRP1) GSA-5210D	
261	5240H-1100A	RUBBER	SIDE HOOT(JRP1)	
262	3550H-1112A	COVER	SIDE PANEL(JRP1)	
263	3550H-1113A	COVER	BACK PANWL(JRP1)	
264	3301H-1017A	PLATE ASSEMBLY	BOTTOM SHIELD(JRP1)	
265	3300H-1242A	PLATE	TOP SHIELD(JRP1)	
266	5240H-1101A	RUBBER	BOTTOM HOOT(JRP1)	
PBS00	6871H-3601A	PWB(PCB) ASSEMBLY	USB2.0/1394 BRIDGE BOARD	
003	3061H-1145A	BEZEL ASSEMBLEY	SILVER(JRP1)	
SCREW				
413	IMPC032418	SCREW, PAN HEAD MACHINE	D3.0 L8.0 MSWR3/FZY	
Note: Refer to DVD MULTI DRIVER ASSY REPLACEMENT PARTS LIST in order to look for the part number of A40.				
MISCELLANEOUS PARTS				
801	3828HM1056G	MANUAL, OWNERS	EXTERNAL DRIVE(GSA-5160D)	
802	3828HN1007G	MANUAL,INSTALLATION	QUICK GUIDE FOR SOFTWARE	
803	3840HW1023B	CARD, WARRANTY	NORTH OR SOUTH AMERICA, OPTICA	
805	3890H-1908A	BOX	GIFT GSA-5160D(W/W)	
806	3890H-1909A	BOX	SHIPPING GSA-5160D(W/W)	
807	3920H-1121A	PACKING	INDIVIDUAL GSA-5160B(EXTERNAL)	
808	3920H-1113A	PACKING	PLASTIC HANDLE FOR BOX	
810	6851HC3003A	CABLE ASSEMBLY	029-500027 DOTOP FT UL2651#28	
811	6851HU7002A	CABLE ASSEMBLY	U00088 DOTOP USB USB	
811	6851HU7002B	CABLE ASSEMBLY	FZ10-04-0740 AMP USB USB	
812	6851HUB001A	CABLE ASSEMBLY	E00014 DOTOP USB IEEE1394	
812	6851HUB001B	CABLE ASSEMBLY	FZ10-04-0742 AMP USB IEEE1394	
813	6851HUC001A	CABLE ASSEMBLY	E00017 DOTOP USB IEEE1394	
813	6851HUC001B	CABLE ASSEMBLY	FZ10-04-0741 AMP USB IEEE1394	

BLOCK DIAGRAM (USB2.0/1394 BRIDGE BOARD)



CIRCUIT DIAGRAM(USB2.0/1394 BRIDGE BOARD)

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J1
PD7
PD6
PD5
PD4
RP1
PD3
PD2
PD1
PD0
RP3
GND
DMARQ R4
DIOWJ R5
DIORJ R6
IORDY R8
DMACKJ R9
INTRQ R11
DA1 R12
DA0 R14
CSJ0 R16
DASP
3.3V
R7
R19
LED1
-RESET
DD07
DD06
DD05
DD04
DD03
DD02
DD01
DD00
GND
DMARQ
-DIOW
-DIOR
IORDY
-DMACK
INTRQ
DA01
DA00
-CS0
-DASP
GND
DD08
DD09
DD10
DD11
DD12
DD13
DD14
DD15
KEY
GND
-IOCS16
-PDIAG
DA02
-CS1
GND
RP2
RP4
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PD9
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PD12
PD13
PD14
PD15
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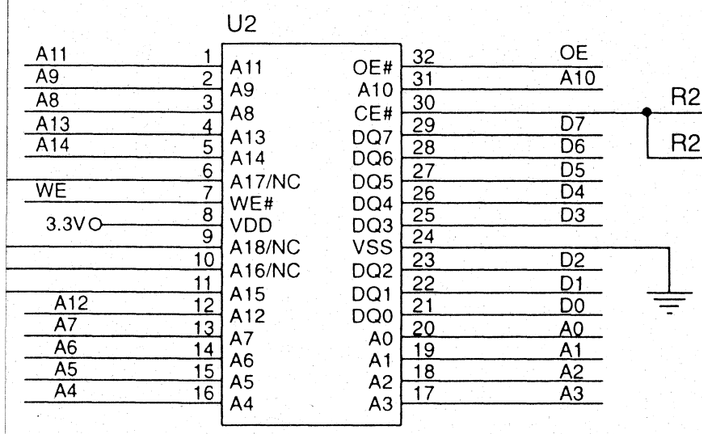
R17
DA2
CSJ1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A8
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A12
A7
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A5
A4
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VDD
A18/NC
A16/NC
A15
A12
A7
A6
A5
A4
OE#
A10
CE#
DQ7
DQ6
DQ5
DQ4
DQ3
VSS
DQ2
DQ1
DQ0
A0
A1
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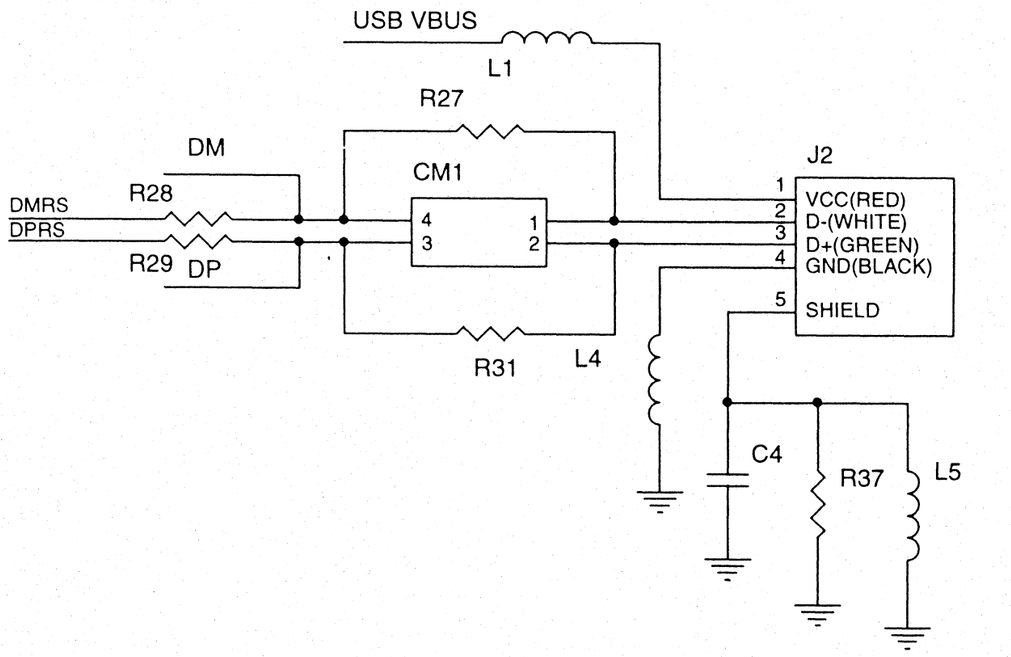
A1
A2
A3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R27
DM
CM1
J2
DMRS
R28
DPRS
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DP
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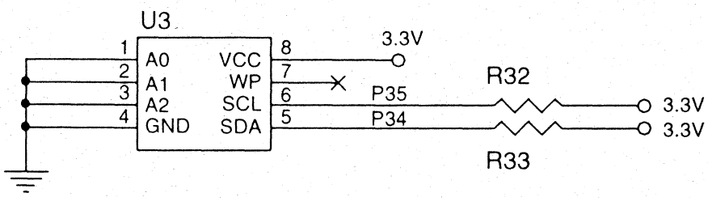
D-(WHITE)
D+(GREEN)
GND(BLACK)
SHIELD
C4
R37
L5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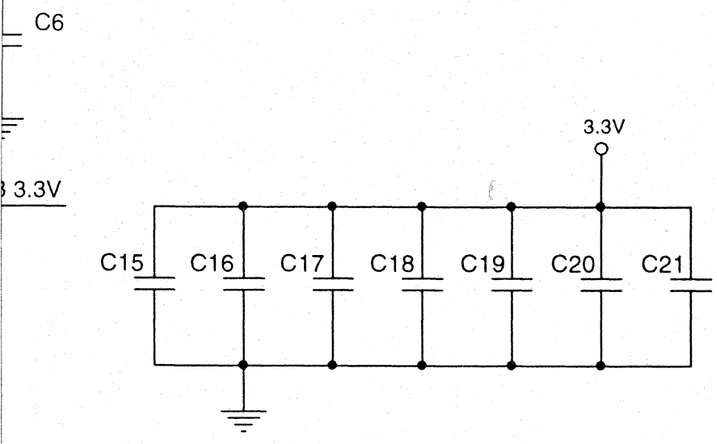
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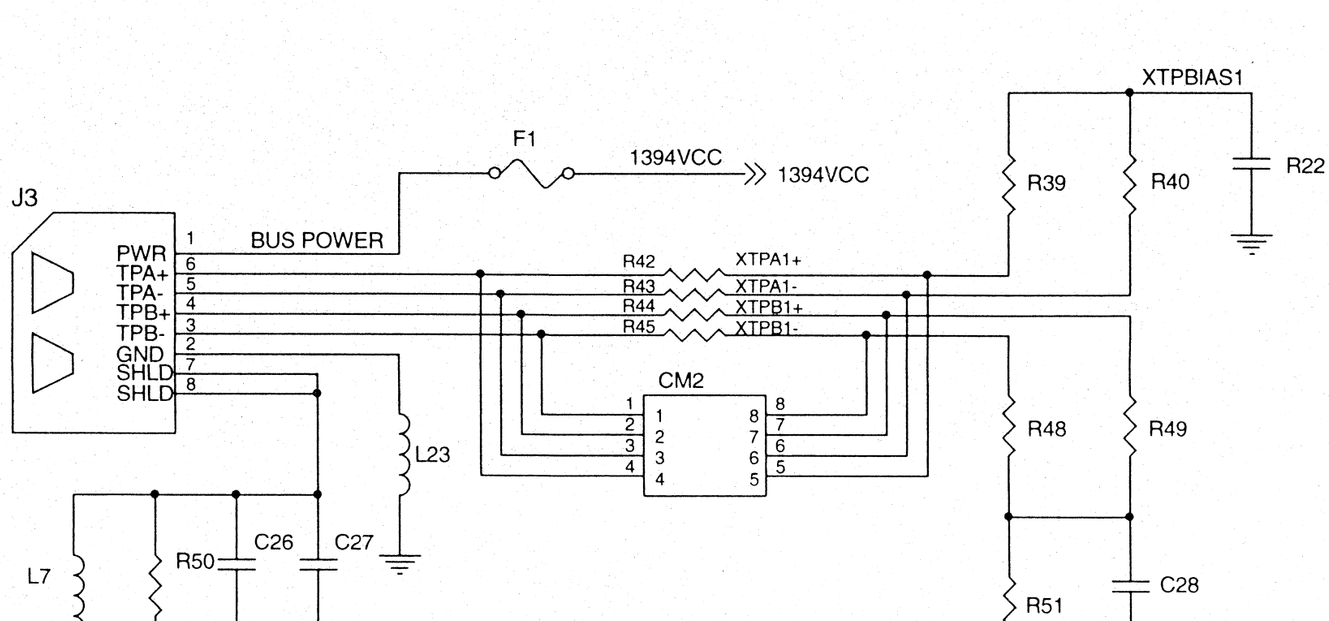
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TPA-
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SHLD
BUS POWER
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R42
R43
R44
R45
XTPA1+
XTPA1-
XTPB1+
XTPB1-
CM2
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R40
R22
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C28
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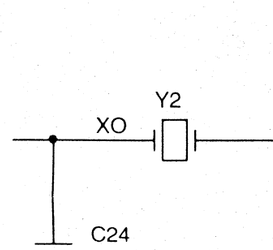
C26
C27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XO
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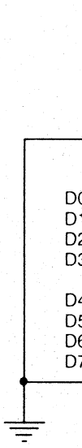
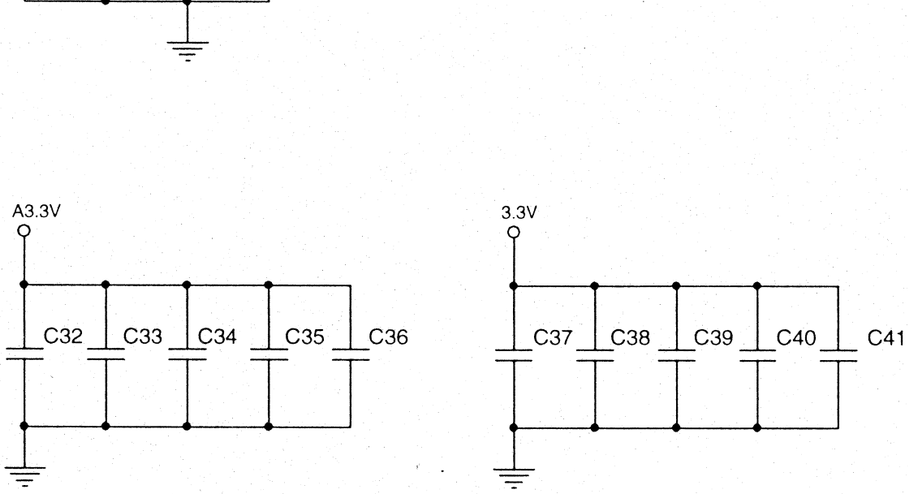

D0
D1
D2
D3
D4
D5
D6
D7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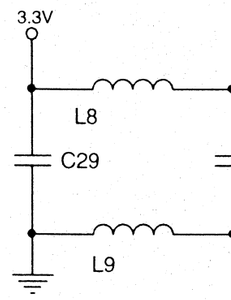
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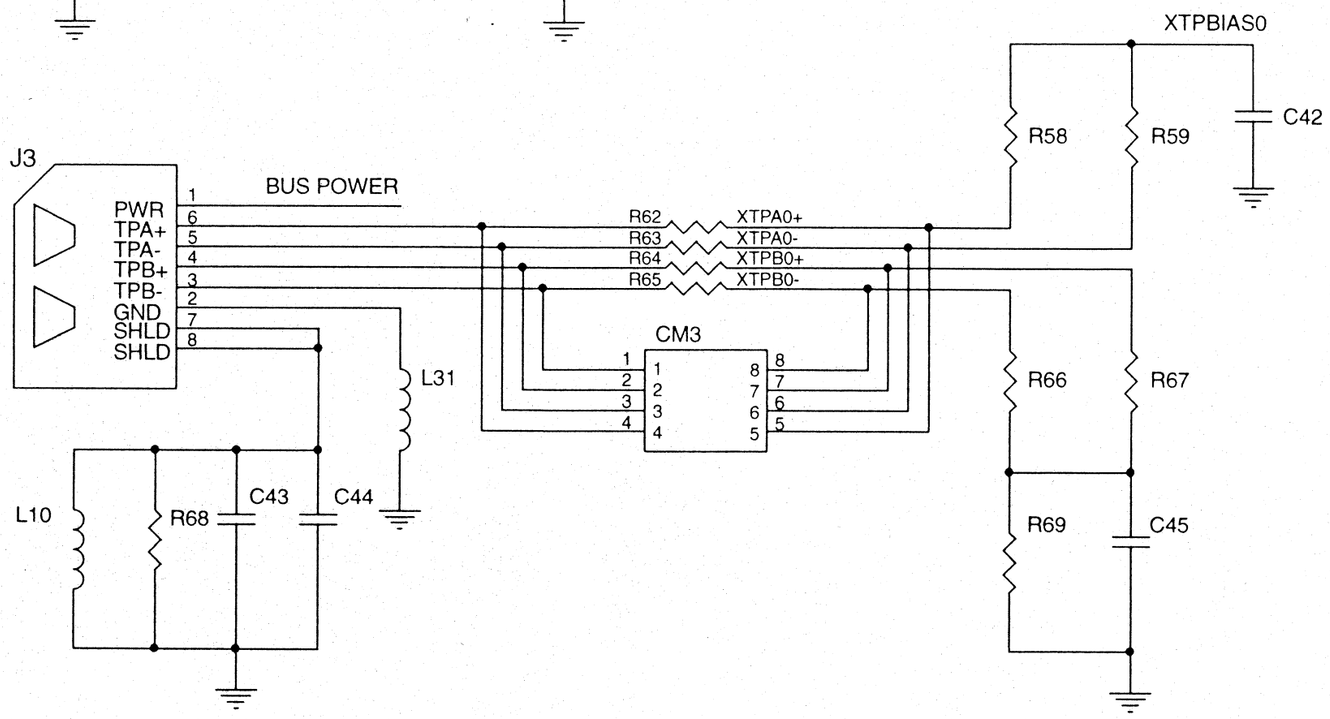
L9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TPA-
TPB+
TPB-
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XTPA0-
XTPB0+
XTPB0-
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R69
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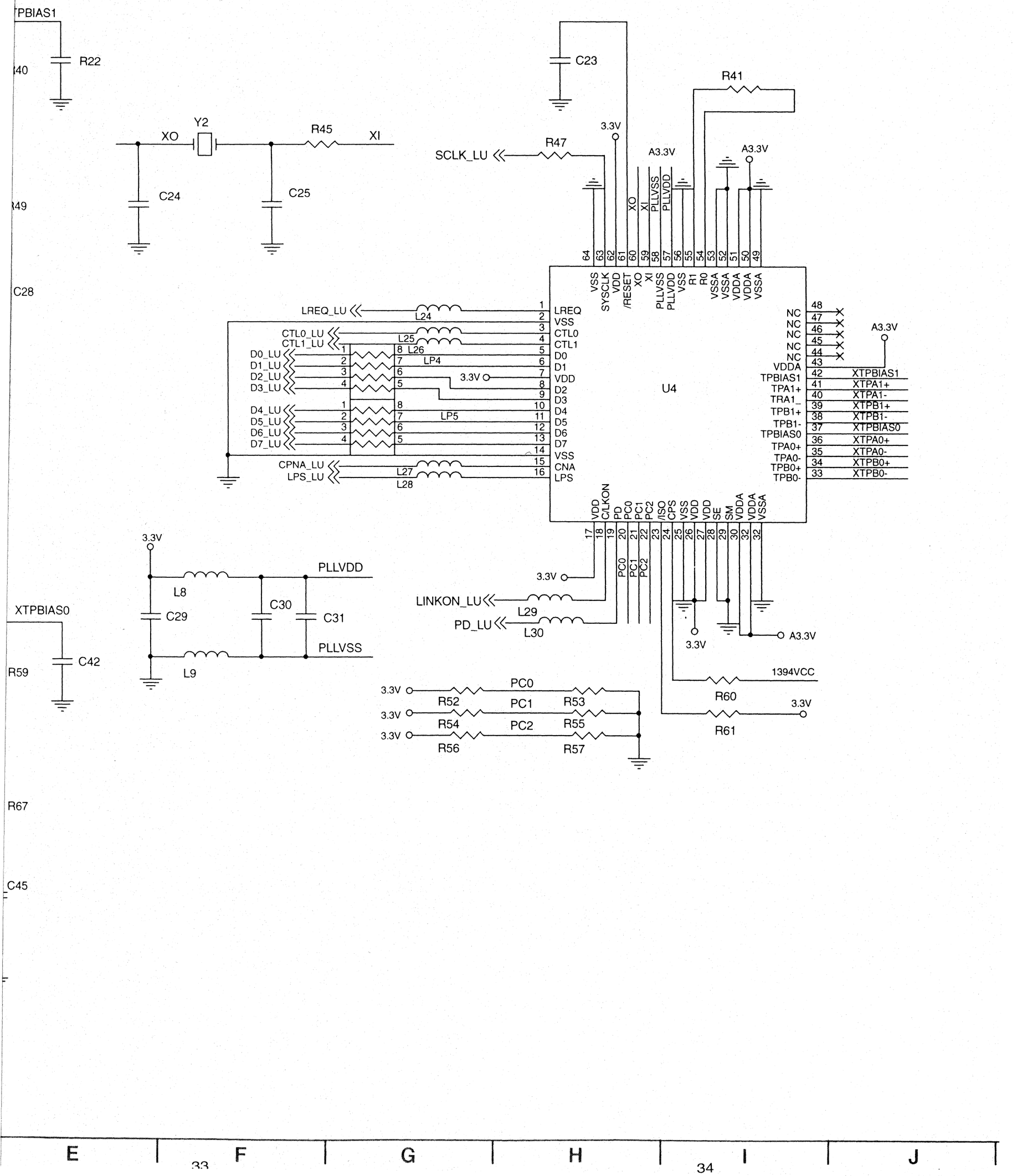
C43
C44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C24
C25
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LREQ_LU
L24
CTL0_LU
CTL1_LU
L25
L26
LP4
D0_LU
D1_LU
D2_LU
D3_LU
3.3V
LP5
D4_LU
D5_LU
D6_LU
D7_LU
CPNA_LU
LPS_LU
L27
L28
U4
LREQ
VSS
CTL0
CTL1
D0
D1
VDD
D2
D3
D4
D5
D6
D7
VSS
CNA
LPS
SYSCLK
/RESET
PLLVSS
PLLVDD
R1
R0
VSSA
VDDA
NC
TPBIAS1
TPA1+
TRA1_
TPB1+
TPB1-
TPBIAS0
TPA0+
TPA0-
TPB0+
TPB0-
XTPBIAS1
XTPA1+
XTPA1-
XTPB1+
XTPB1-
XTPBIAS0
XTPA0+
XTPA0-
XTPB0+
XTPB0-
C/LKON
PD
PC0
PC1
PC2
/ISO
CPS
SM
SE
3.3V
PLLVDD
L8
C29
C30
C31
PLLVSS
L9
XTPBIAS0
C42
R59
LINKON_LU
L29
PD_LU
L30
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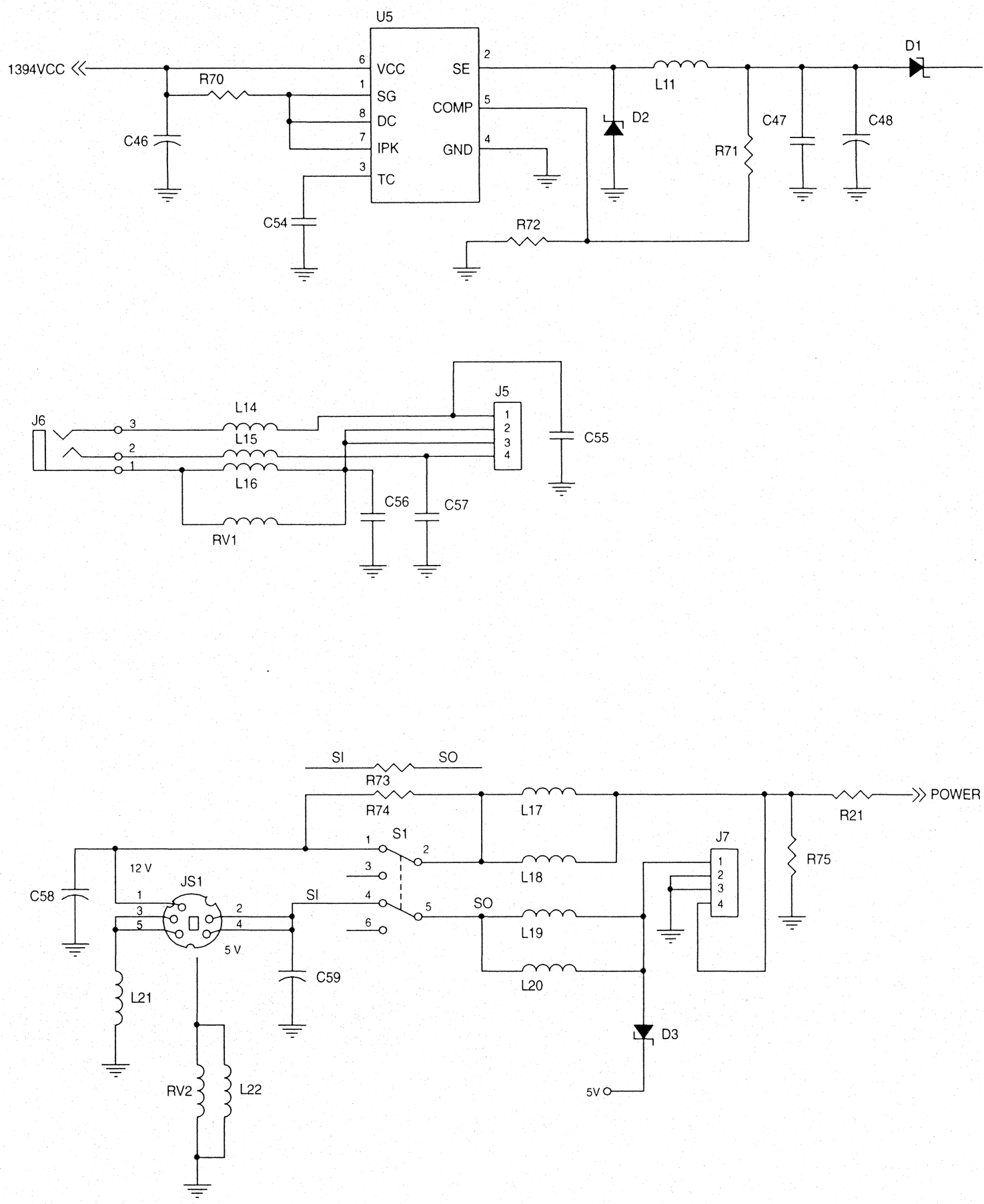
1394VCC
R60
R61
R52
R53
R54
R55
R56
R57
R67
C45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GND
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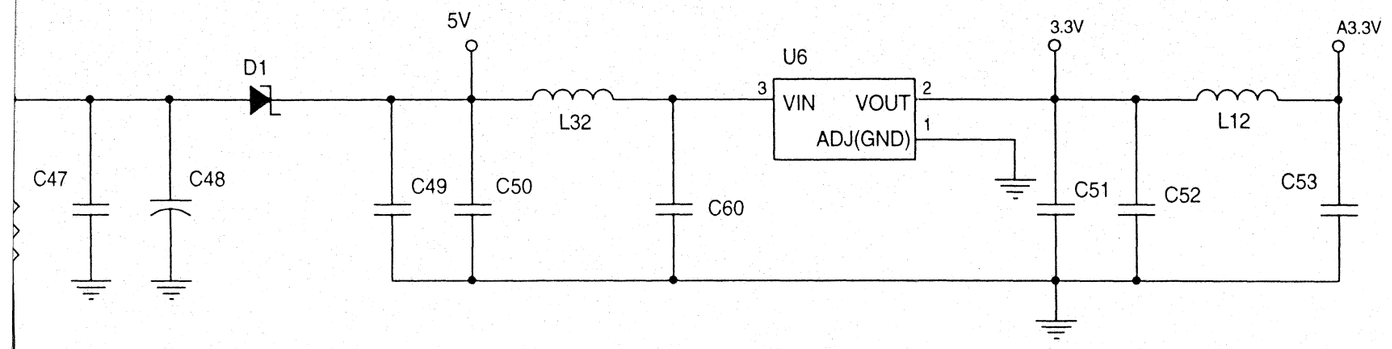
C47
C48
R72
J5
J6
L14
L15
L16
RV1
C56
C57
C55
SI
SO
R73
R74
L17
L18
L19
L20
S1
J7
R75
R21
POWER
12 V
JS1
5 V
C58
C59
L21
RV2
L22
D3
5V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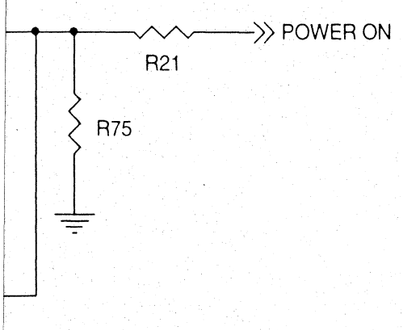
D1
U6
3.3V
A3.3V
3
VIN
VOUT
2
ADJ(GND)
1
L32
L12
C47
C48
C49
C50
C60
C51
C52
C53


POWER ON
R21
R75

SECTION II DVD MULTI DRIVE ASSY

DISASSEMBLY

1. CABINET and CIRCUIT BOARD DISASSEMBLY

1-1. Bottom Chassis

A. Release 4 screws (A) and remove the Bottom Chassis in the direction of arrow (1). (See Fig.1-1)

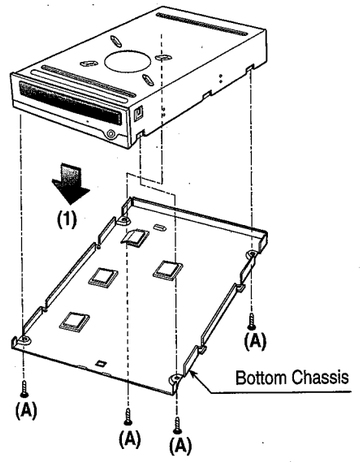


Fig. 1-1

1-2. Front Bezel Assy

A. Insert and press a rod in the Emergency Eject Hole and then the CD Tray will open in the direction of arrow (2).
B. Remove the Tray Door in the direction of arrow (3) by pushing the stoppers forward.
C. Release 3 stoppers and remove the Front Bezel Assy.

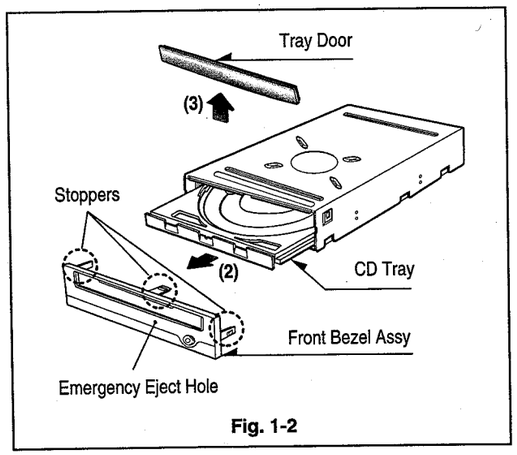


Fig. 1-2

1-3. Cabinet and Main Circuit Board

A. Remove the Cabinet in the direction of arrow (4). (See Fig. 1-3)
B. Release 2 hooks (a) and remove the CD Tray drawing forward.
C. Remove the Main Circuit Board in the direction of arrow (5).
D. At this time, be careful not to damage the 4 connectors, are positioned at left and bottom sides, of the Main Circuit Board.

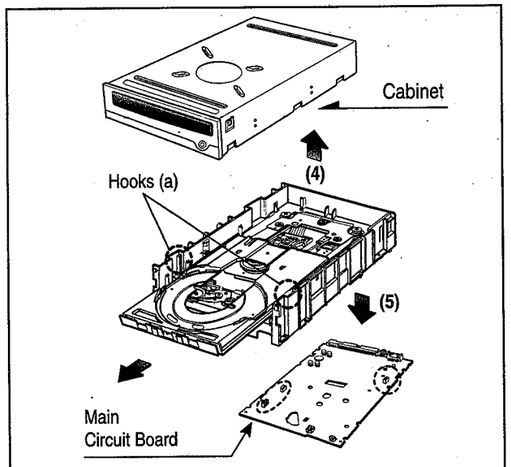


Fig. 1-3

2. MECHANISM ASSY DISASSEMBLY

2-1. Pick-up Unit

A. Release screws (B).
B. Separate the Pick-up Unit in the direction of arrow (6).

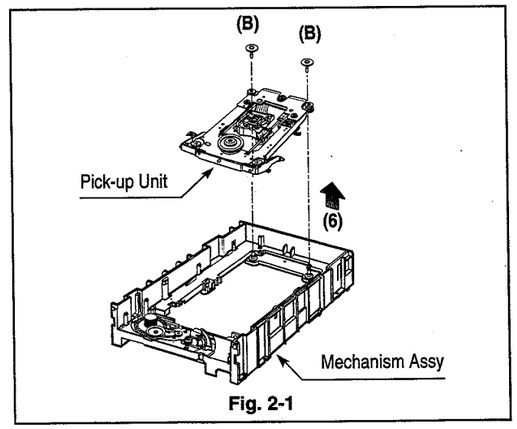


Fig. 2-1

2-2. Pick-up

A. Release 1 screw (C) and remove the Pick-up.

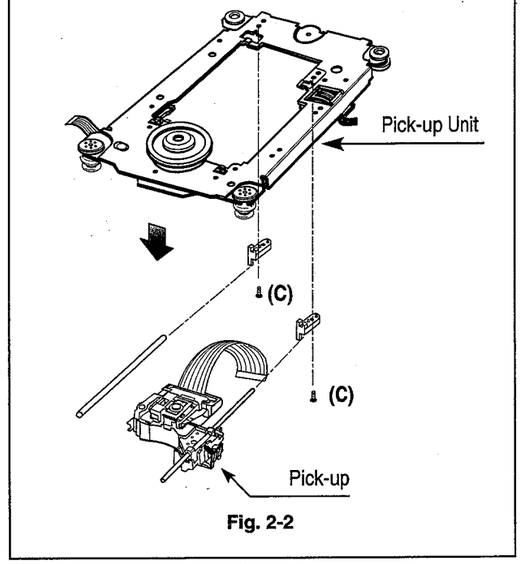
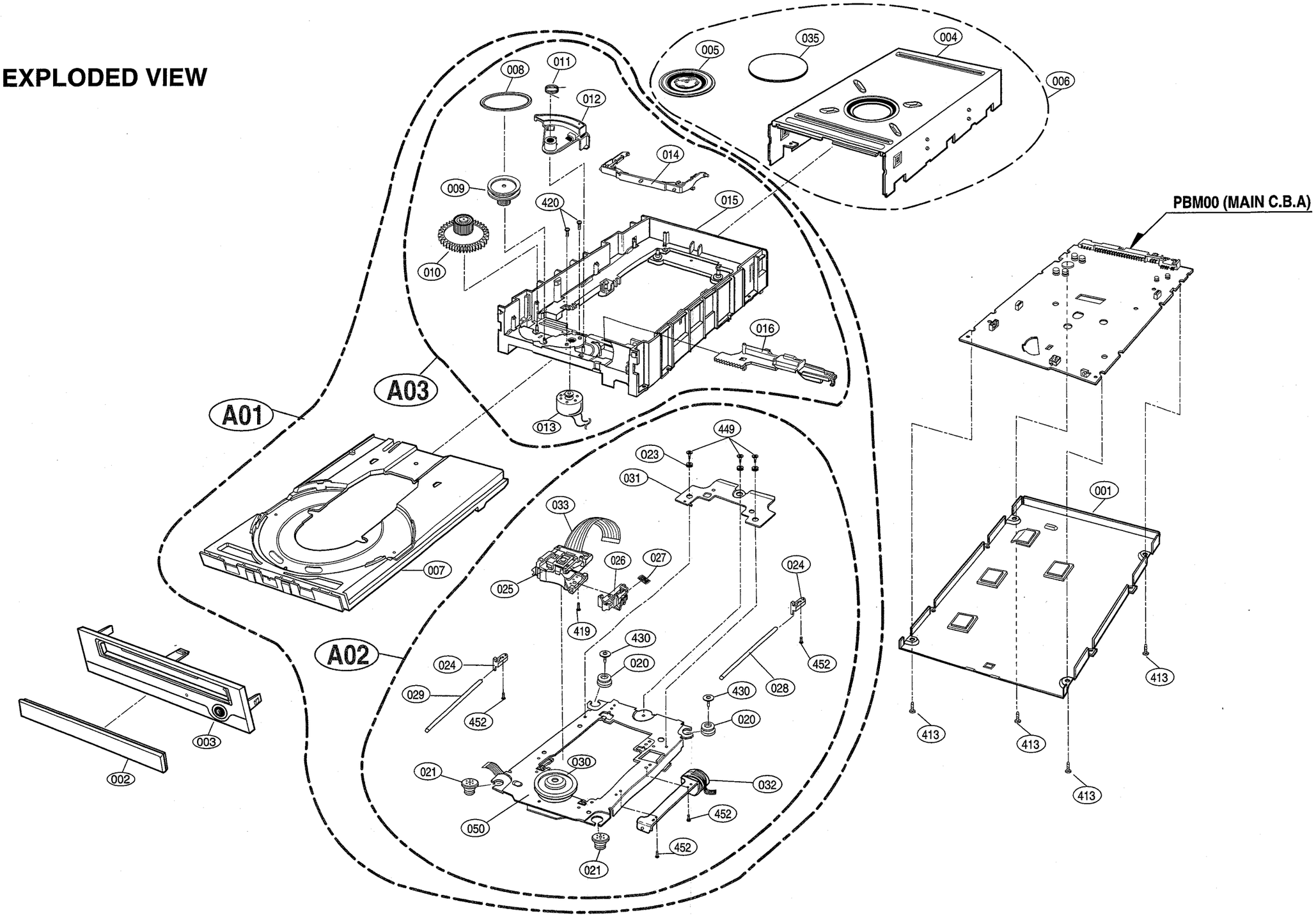


Fig. 2-2

EXPLODED VIEW



MECHANICAL REPLACEMENT PARTS LIST

• **MODEL: GSA-5120D**

RUN DATE : 04.11.26
NSP: Not Service Part

S	AL	LOCA.NO	PART NO(GS)	DESCRIPTION	SPECIFICATION	REMARKS
				ASSEMBLY PARTS SECTION		
		A01	4405H-T205A	MECHANISM ASSEMBLY	MD ASSY GSA-4160B PT	
		A02	3041H-T021A	BASE ASSEMBLY	JR4 PU ASSY GSA-4160B	
		A03	4405H-T206A	MECHANISM ASSEMBLY	LOADING ASSY GSA-4160B PT	
				PARTS SECTION		
		001	3081H-1040A	BOTTOM ASSEMBLY	JR4 SECC T0.6	
		002	3580H-1091A	DOOR	JRP1(GSA-5120D) N-D SILVER	
		003	3061H-1145A	BEZEL ASSEMBLY	JRP1(GSA-5120D) SLIVER	
		004	3090H-1041A	CABINET	MECHA DT D=52.4 JR4 EGI T0.6 C	
		005	4861H-0018A	CLAMP ASSEMBLY	JC5 WHITE (4860H-1022D)	
		006	3091H-1046A	CABINET ASSEMBLY	JR4 GSA-4120B EGI 0.6T	
		007	3390H-T015A	TRAY	DISC JR4 WHITE	
		008	4400H-1012A	BELT	LOADING CED-8120B	
		009	4560H-1015A	PULLEY	GEAR CRD-8400B	NSP
		010	4470H-1115A	GEAR	LOADING CRD-8400B	
		011	4970H-1087A	SPRING	LEVER SWITCH(GM-RT1332A) CRD-8	
		012	4510H-1059A	LEVER	SWITCH JC3 POM	
		013	4680HP2010A	MOTOR(MECH)	RF-300EH-1D390 MABUCHI LOADING	
		014	3040H-T020A	BASE	UP/DOWN JR4 LUPOY GP-2200	NSP
		015	3040H-T021A	BASE	MAIN JR4 LUMAX GN-5006F	NSP
		016	4974H-T042A	GUIDE	UP/DOWN JR4 LUCEL N109LD	NSP
		020	5040H-T020A	RUBBER	RUBBER REAR(JR4) JR4 0	NSP
		021	5040H-T017A	RUBBER	FRONT JR4	NSP
	OR	021	5040H-T017B	RUBBER	FRONT JR4/4-1/JW1 KEEPER	NSP
		023	5040H-T019A	RUBBER	RUBBER DVA(JR4) JR4 0	NSP
	OR	023	5040H-T019B	RUBBER	DVA JR4/4-1/JW1 KEEPER	NSP
		024	4930H-1121A	HOLDER	SHAFT JR4 KEPITAL F20-03,LUCEL	
		025	6716DAD002A	PICK UP,DVD	HOP-8541T HITACHI RAM(PC) JR4	
	OR	025	6716DAD002B	PICK UP,DVD	HOP-8541T HITACHI RAM(PC) MITS	
	OR	025	6716DAD002C	PICK UP,DVD	HOP-8541T HITACHI RAM(PC) MITS	
		026	4974H-1109A	GUIDE	FEED JR4 KEPITAL TX-31 NATURAL	
		027	4970H-1136A	SPRING	GUIDE FEED GCC-4120B ,	
		028	4370H-1136A	SHAFT	SHAFT PU-R JR3 SUS-420 J2	NSP
		029	4370H-1137A	SHAFT	SHAFT-L JR4 SUS-420 J2	NSP
		031	4810H-T025A	BRACKET	BRACKET DVA, JR4, SECC_ 2.0	NSP
	OR	032	4680HP5030A	MOTOR(MECH)	SPS-15RF-173K MOATECH STEPPING	
		032	4680HP5033A	MOTOR(MECH)	MSAP020H06 SANKYO STEPPING	
		033	6850HC05616	CABLE,FLAT	SUMITOMO UL2896 P=0.5MM 54P 10	
	OR	033	6850HC05617	CABLE,FLAT	YOUNGSHIN UL2896 P=0.5MM 54P 9	
		035	3550H-1072A	COVER	CABINET CLAMP (V7)	NSP
		050	3040H-T022A	BASE	CHASSIS PU, JR4 SECC 2.0	NSP
				SCREW		
		413	1MPC0302418	SCREW,PAN HEAD MACHINE +!	D 3.0 L 8.0 MSWR3/FZY	
		419	1SZZH-1005F	SCREW,DRAWING	FLAT HEAD D1.7 3MM SWRCH16A/BK	
		420	4000H-1006B	SCREW,DRAWING	+ D1.7 4.5MM SWRCH16A/ZNY 4MM	
		430	1SZZH-1003C	SCREW,	+ D2.0 10MM SWRCH16A/ZNY 4.5MM	
		449	1SZZH-1074A	SCREW,DRAWING	ROUND D2.0 8MM SWCH18A/BZN 9MM	
		452	1SZZH-1072B	SCREW,DRAWING	+ D2.0 4.5MM SWRCH16A/ZNY 4MM	

MECHANICAL REPLACEMENT PARTS LIST

• MODEl: GSA-5160D

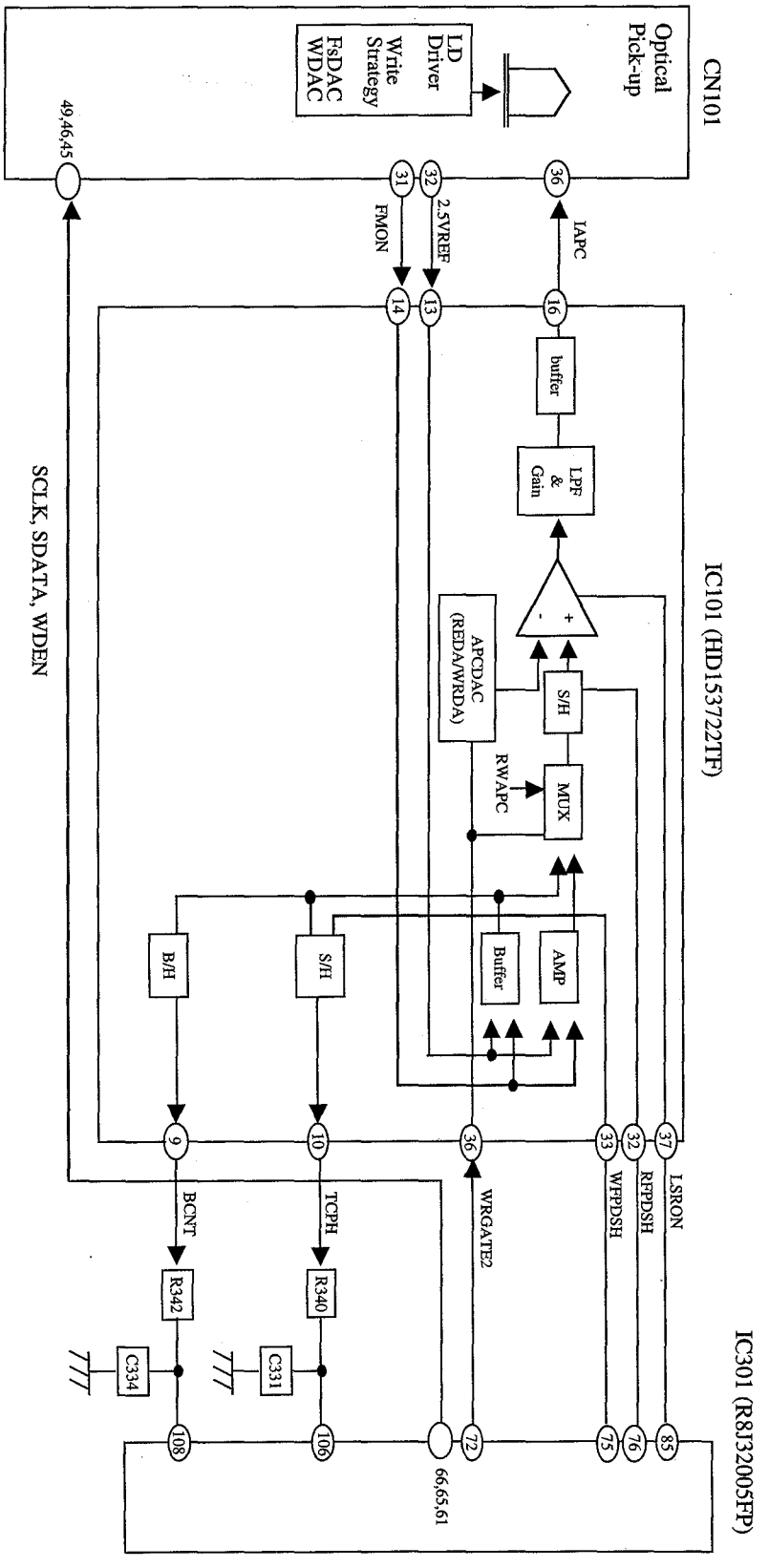
RUN DATE : 04.11.26
NSP: Not Service Part

S	AL	LOCA.NO	PART NO(GS)	DESCRIPTION	SPECIFICATION	REMARKS
				ASSEMBLY PARTS SECTION		
		A01	4405H-T205G	MECHANISM ASSEMBLY	MD ASSY JR4-1 STANDARD WHITE	
		A02	3041H-T021D	BASE ASSEMBLY	PU ASSY JR4-1 -E-	
		A03	4405H-T206A	MECHANISM ASSEMBLY	LOADING ASSY GSA-4160B PT	
				PARTS SECTION		
		001	3081H-1040A	BOTTOM ASSEMBLY	JR4 SECC T0.6	
		002	3580H-1091A	DOOR	JRP1(GSA-5120D) N-D SILVER	
		003	3061H-1145A	BEZEL ASSEMBLY	JRP1(GSA-5120D) SLIVER	
		004	3090H-1043A	CABINET	MECHA DT D=52.4 JR4-1 GSA-4160	
		005	4861H-0018A	CLAMP ASSEMBLY	JC5 WHITE (4860H-1022D)	
		006	3091H-1048A	CABINET ASSEMBLY	JR4-1 GSA-4160B EGI 0.6T 3.8H	
		007	3390H-T015A	TRAY	DISC JR4 WHITE	
		008	4400H-1012A	BELT	LOADING CED-8120B	
		009	4560H-1015A	PULLEY	GEAR CRD-8400B ,	NSP
		010	4470H-1115A	GEAR	LOADING CRD-8400B ,	
		011	4970H-1087A	SPRING	LEVER SWITCH(GM-RT1332A) CRD-8	
		012	4510H-1059A	LEVER	SWITCH JC3 POM	
		013	4680HP2010A	MOTOR(MECH)	RF-300EH-1D390 MABUCHI LOADING	
		014	3040H-T020A	BASE	UP/DOWN JR4 LUPOY GP-2200	NSP
		015	3040H-T021A	BASE	MAIN JR4 LUMAX GN-5006F	NSP
		016	4974H-T042A	GUIDE	UP/DOWN JR4 LUCEL N109LD	NSP
		020	5040H-T020A	RUBBER	RUBBER REAR(JR4) JR4 0	NSP
	OR	020	5040H-T020B	RUBBER	REAR JR4/JR4-1/JW1 KEEPER	NSP
		021	5040H-T017A	RUBBER	FRONT JR4	NSP
	OR	021	5040H-T017B	RUBBER	FRONT JR4/4-1/JW1 KEEPER	NSP
		023	5040H-T019A	RUBBER	RUBBER DVA(JR4) JR4 0	NSP
	OR	023	5040H-T019B	RUBBER	DVA JR4/4-1/JW1 KEEPER	NSP
		024	4930H-1121A	HOLDER	SHAFT JR4 KEPITAL F20-03,LUCEL	
		025	6716DAD002C	PICK UP,DVD	HOP-8541T HITACHI RAM(PC) MITS	
		026	4974H-1109A	GUIDE	FEED JR4 KEPITAL TX-31 NATURAL	
		027	4970H-1136A	SPRING	GUIDE FEED GCC-4120B ,	
		028	4370H-1136A	SHAFT	SHAFT PU-R JR3 SUS-420 J2	NSP
		029	4370H-1137A	SHAFT	SHAFT-L JR4 SUS-420 J2	NSP
		031	4810H-T025A	BRACKET	BRACKET DVA, JR4, SECC_ 2.0	NSP
	OR	032	4680HP5030A	MOTOR(MECH)	SPS-15RF-173K MOATECH STEPPING	
		032	4680HP5033A	MOTOR(MECH)	MSAP020H06 SANKYO STEPPING	
		033	6850HC05616	CABLE,FLAT	SUMITOMO UL2896 P=0.5MM 54P 10	
	OR	033	6850HC05617	CABLE,FLAT	YOUNGSHIN UL2896 P=0.5MM 54P 9	
		035	3550H-1072A	COVER	CABINET CLAMP (V7)	NSP
		050	3040H-T022A	BASE	CHASSIS PU, JR4 SECC 2.0	NSP
				SCREW		
		413	1MPC0302418	SCREW,PAN HEAD MACHINE +I	D 3.0 L 8.0 MSWR3/FZY	
		419	1SZZH-1005F	SCREW,DRAWING	FLAT HEAD D1.7 3MM SWRCH16A/BK	
		420	4000H-1006B	SCREW,DRAWING	+ D1.7 4.5MM SWRCH16A/ZNY 4MM	
		430	1SZZH-1003C	SCREW,	+ D2.0 10MM SWRCH16A/ZNY 4.5MM	
		449	1SZZH-1074A	SCREW,DRAWING	ROUND D2.0 8MM SWCH18A/BZN 9MM	
		452	1SZZH-1072B	SCREW,DRAWING	+ D2.0 4.5MM SWRCH16A/ZNY 4MM	

DESCRIPTION OF CIRCUIT

1. ALPC (Automatic Laser Power Control) Circuit

1-1. Block Diagram



1-2. ALPC (Automatic Laser Power Control) Circuit

ALPC function DVD/CD anlaog front-end IC(IC101 HD153722TF) is for constant power control purpose. Based on the accurate power sensor(FMON) in P/U, ALPC feedback loop maintains constant power level against laser diode's temperature variation.

The ALPC loop amplifies(10x) the FMON signal to enhance the accuracy of read power level control. Swithching of amplification is made by combination of a logical WRGATE2 signal and a logical RWAPC signal.

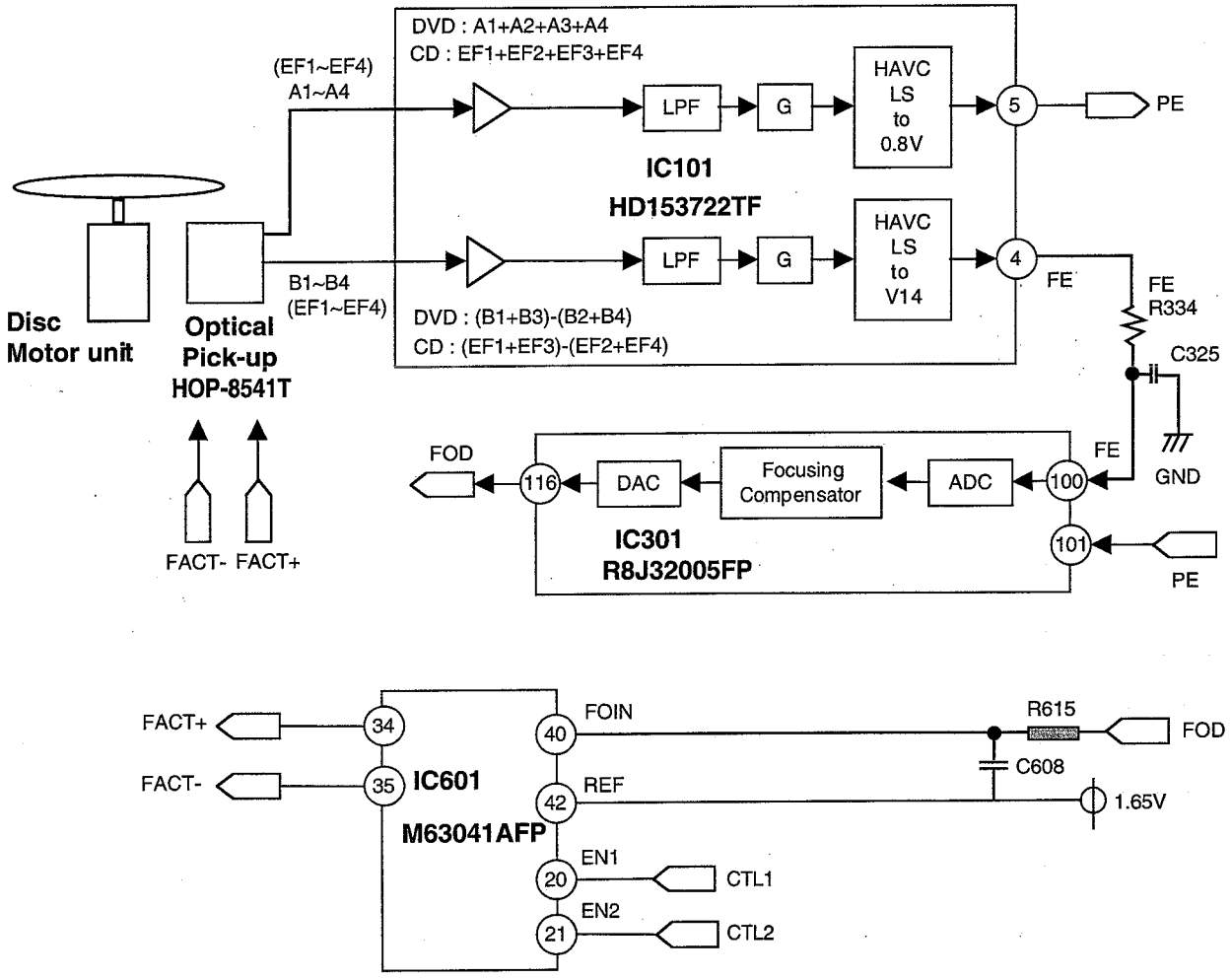
There are two set of APCDAC, which are used at different term to monitor different power level. Generally, the one is used at reading and the other one is used at writing. The logical WRGATE2 signal which is switched between reading and writing changes the two APCDAC.

The ALPC loop supplies same currency (IAPC) to Laser Diode Driver(LDD) during reading and writing.

There is another ALPC which controls Full-Scale-DAC (FsDAC). FsDAC determines scale of WDAC of Laser Diode Driver. MPU monitors write-power level of FMON signal and changes FsDAC directly to maintain constant write-power level. There are two write power signal. The one is based on S/H signal and the other one is based on B/H(Bottom-Hold) signal. The write power levels are monitored as digital levlels which are converted by built-in Anlog-Digital Converter in DSP. The MPU monitors each write power level and calculates proper setting of FsDAC, and changes value through serial interface between LDD and DSP.

2. Focus Circuit

2-1. Block Diagram



2-2. Focus Servo

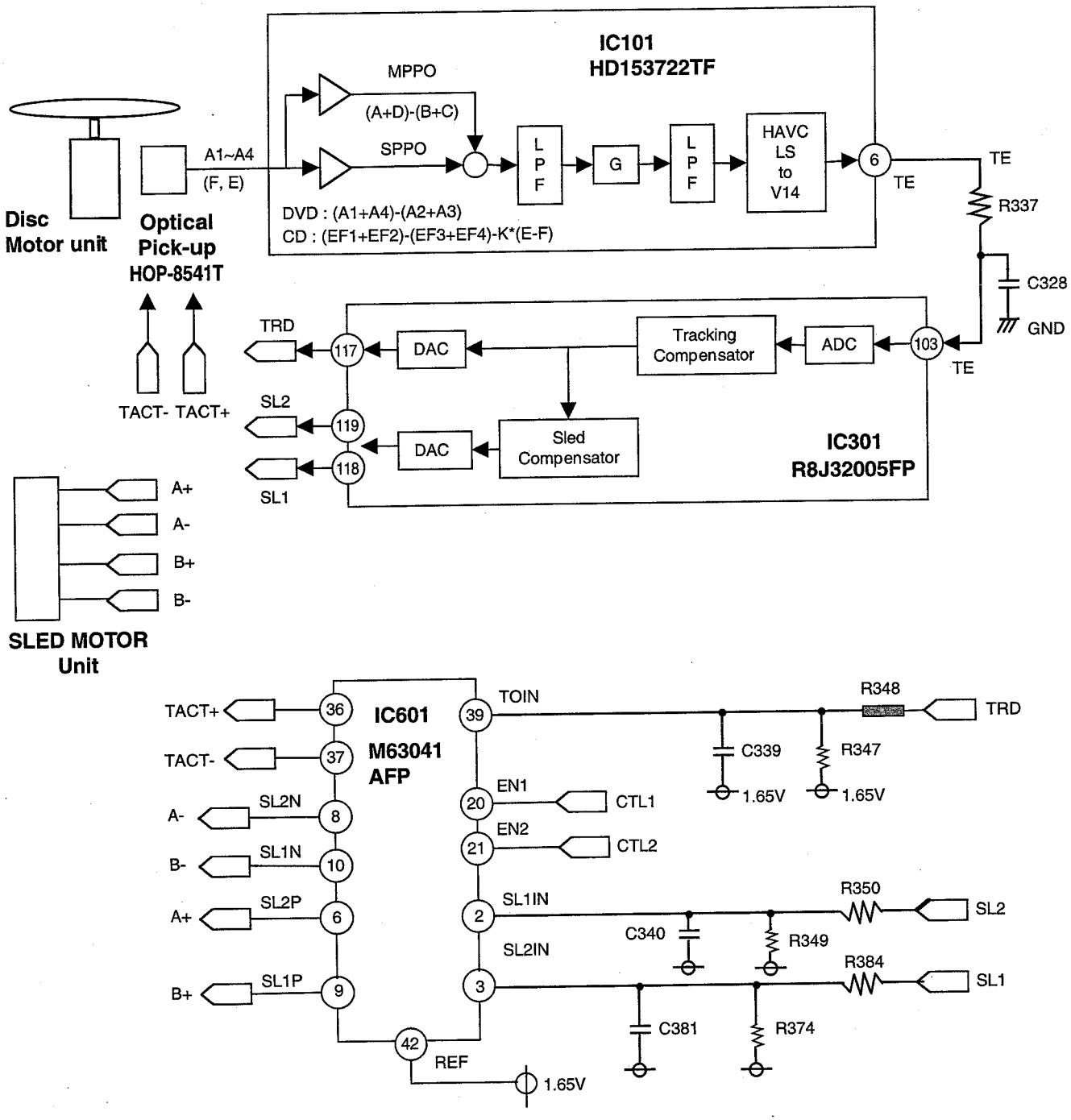
The aim of Focus Servo is to maintain the distance between object lens of P/U and disc surface, so that the detected RF signal(A1, A2, A3, A4, B1, B2, B3, B4, EF1, EF2, EF3, EF4) can be maximized.

Focus Error Signal(FE) generates from focus error detection block in RF IC(HD153722) using Double knite Edge method (DVD), spot size Detection method(CD).
Focus Gain and path can be changed at the RF IC(HD153722) according to the disc, and the resulting output FE(HD153722 4pin) is input to DSP IC(HD153722 100pin).
The Focus Search operation is using FE, PE Signal, therefore check FE, PE signals when Focusing is failed.

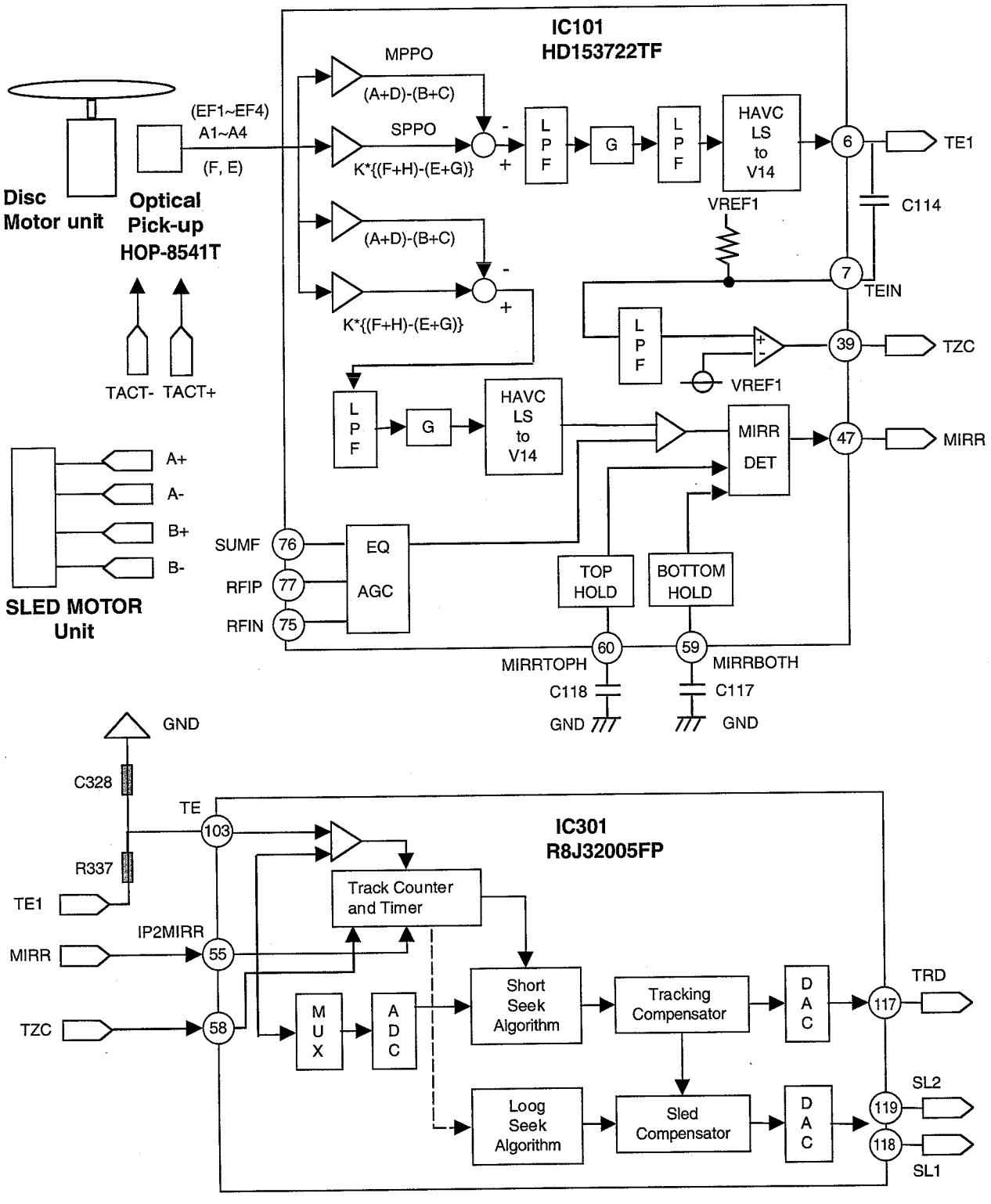
The role of DSP IC(R8J32005FP) is Focus Digital Controller. The operation path is as follows;
FE Signal is input to DSP IC(R8J32005FP 100pin), and after A/D Conversion, Digital Equalizer Block and D/A Conversion in R8J32005FP, the output signal FOD(R8J32005FP 116pin) is input to Drive IC(M63041AFP 40pin).
The drive output signal FACT+/FACT- generated according FOIN(M63041AFP 40pin), and drives focus actuator in the P/U unit.

3. Tracking & Sled Circuit

3-1-1. Block Diagram (Tracking Following)



3-1-2. Block Diagram (Seek)



3-2-1. Tracking Servo

The aim of tracking servo is to make laser beam trace the data track on disc.

Tracking Error(TE) Signal is generated from tracking error detected block in HD153722 using DPP(Differential Push-Pull) Method(CD) and PP(Push-Pull) Method(DVD).
DPP Method uses not only main beam(EF1~EF4) but also side beam(E, F) for correcting DC offset generated in Push-Pull Method.

The remaining procedure of TE signal processing in R8J32005FP is similar to Focus Servo.
The role of DSP IC(R8J32005FP) is Tracking Digital Controller.
TE Signal is input to DSP IC(R8J32005FP 103pin), and after A/D Conversion, Digital Equalizer Block and D/A Conversion in R8J32005FP, the output signal TRD(R8J32005FP 117pin) is input to Drive IC(39pin).

The drive output signal TACT+/TACT- generated according TOIN(M63041AFP 39pin), and drives tracking actuator in the P/U unit.

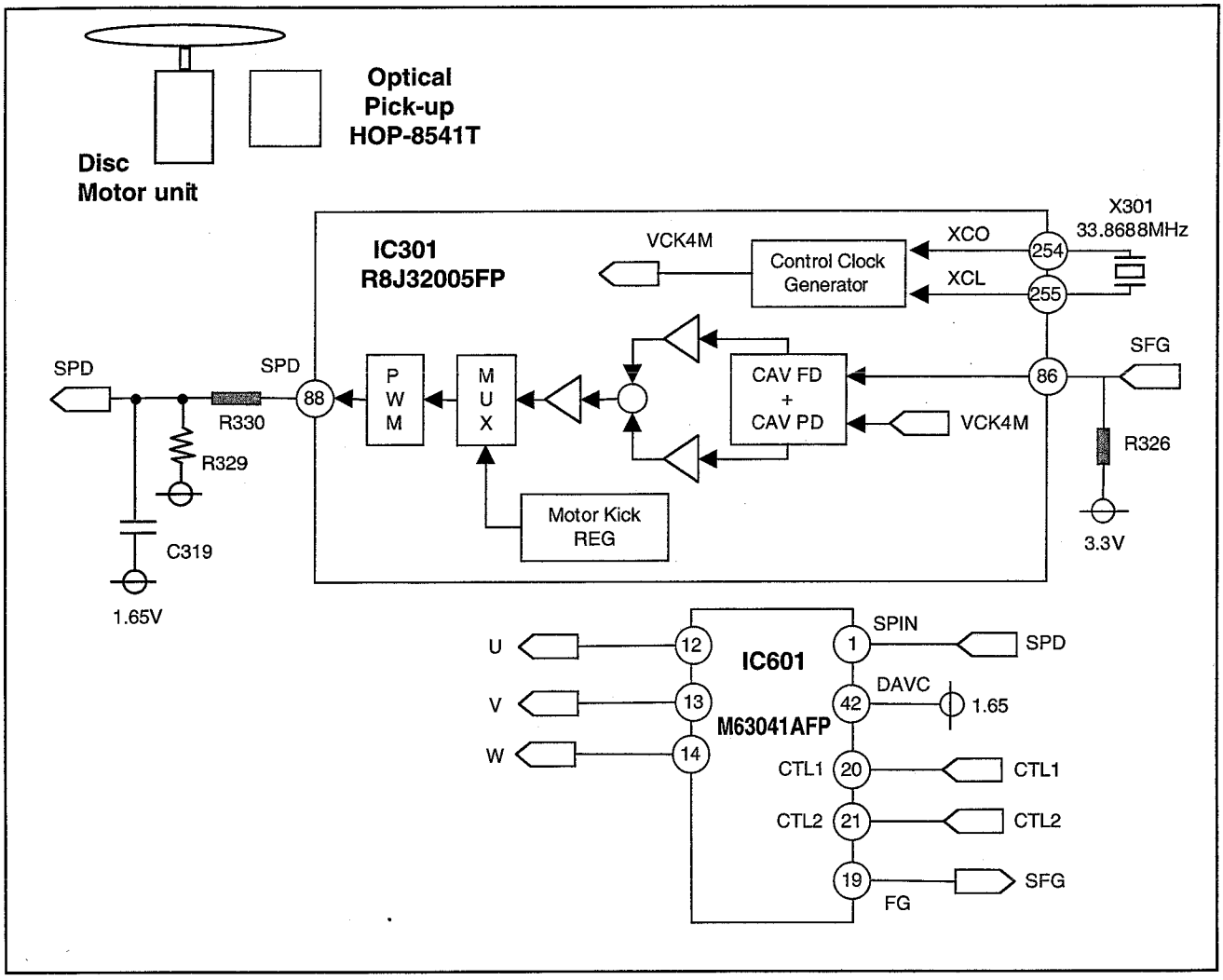
3-2-2. Sled Servo

The working distance of tracking actuator is too short to cover whole disc radius.
Sled Servo make P/U move by little and little so that the laser beam keep tracing the data track on disc continuously when tracking actuator reaches the working limit.

TE Signal is input to DSP IC(R8J32005FP 103pin), and after A/D Conversion, Digital Tracking Equalizer Block, Digital Sled Compensator Block and D/A Conversion in R8J32005FP, the output signal SL1, SL2(R8J32005FP 118, 119pin) is input to Drive IC (M63041AFP 2, 3pin) after Low-Pass filtering.

4. Spindle Circuit

4-1-1. Block Diagram(FGCAV Servo)



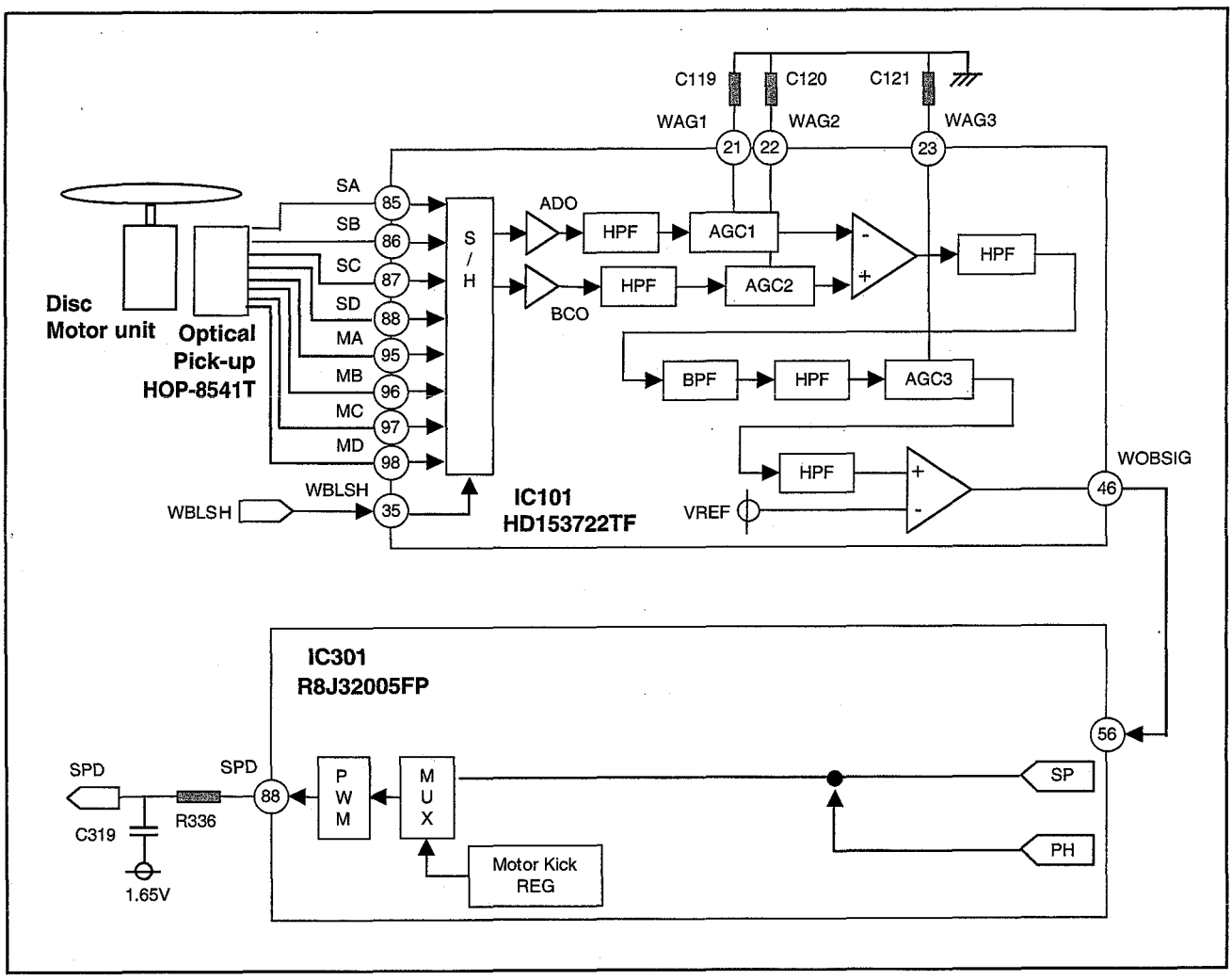
4-1-2. FG CAV Servo

1) CD 40x CAV : CD-RW, CD-R, CD-ROM
2) DVD 8x CAV : DVD±RW, DVD-ROM dual
3) DVD 10x CAV : DVD±R
4) DVD 16x CAV : DVD-ROM(Single)

When drive read PRESS CD, Closed Session CD-R/RW, the spindle motor is controlled using FG CAV Spindle Servo. FG signal(M63041AFP 19pin) input to SFG in DSP IC(IC301 86pin).
The spindle controller in DSP IC uses SFG as spindle rotation frequency feedback, therefore the FG CAV Spindle Servo doesn't work well if FG generation is abnormal.

The spindle controller PWM output signal SPD(IC301 88pin) input to SPIN in Drive IC(M63041AFP 1pin) after Low-Pass Filtering.
The PWM output signal U, V, W signal(M63041AFP 12, 13, 14pin) drives Spindle Motor without using a sensor, and FG pulse output is generated as 18 pulses/rotation.

4-2-1. Block Diagram (Wobble CLV Servo)



4-2-2. Wobble CLV Servo

DVD-RAM: 2x, 3x, 5x / DVD-R: 8x, 4x, 2x
/ DVD+R: (GSA-5120D : 12x, 8x, 4x, 2.4x,
GSA-5160D : 16x, 8x, 4x, 2.4x)
/ DVD-RW: 1x, 2x, 4x / DVD+RW: 2.4x, 4x
/ CD-R: 4x, 8x, 16x, 24x,32x, 40x / CD-RW: 4x, 8x, 10x, 16x, 24x

When drive write DVD-RAM/R/RW/+R/+RW/CD-R/CD-RW, the spindle motor is controlled using Wobble CLV Spindle Servo.

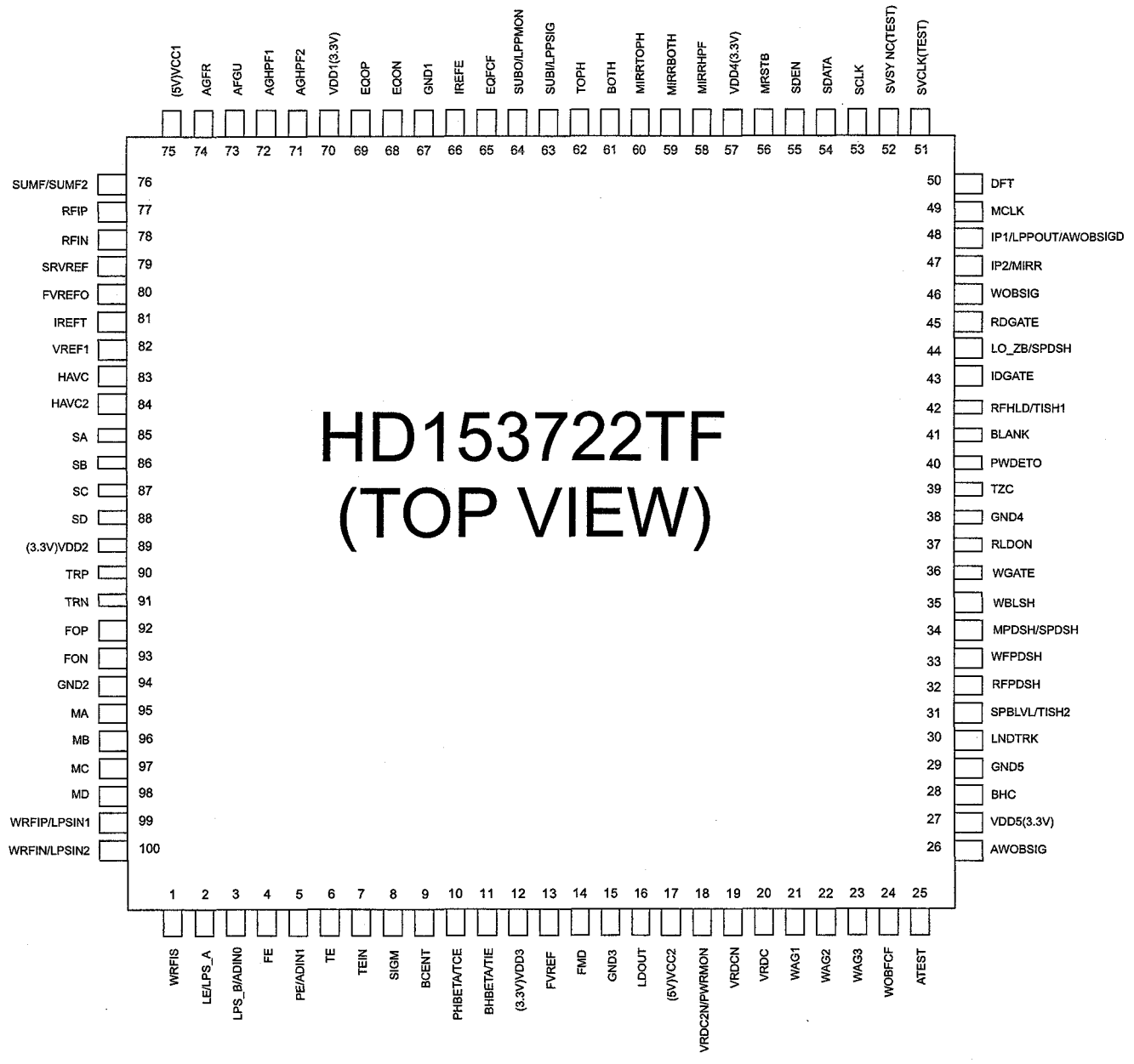
The WOBSIG signal(HD153722TF 46pin) input to DSP IC(R8J32005FP 56pin). The DSP Controller in R8J32005FP uses WOBSIG as linear velocity feed back, therefore the Wobble CLV Spindle Servo doesn't work well when WOBSIG signal is abnormal.

The spindle controller PWM output signal SPD (R8J32005FP 88pin) input to SPIN in Drive IC(M63024AFP 1pin) after Low-Pass Filtering.
The PWM output signal U,V, W signal(M63041AFP 12, 13, 14pin) drives Spindle Motor without using a sensor.

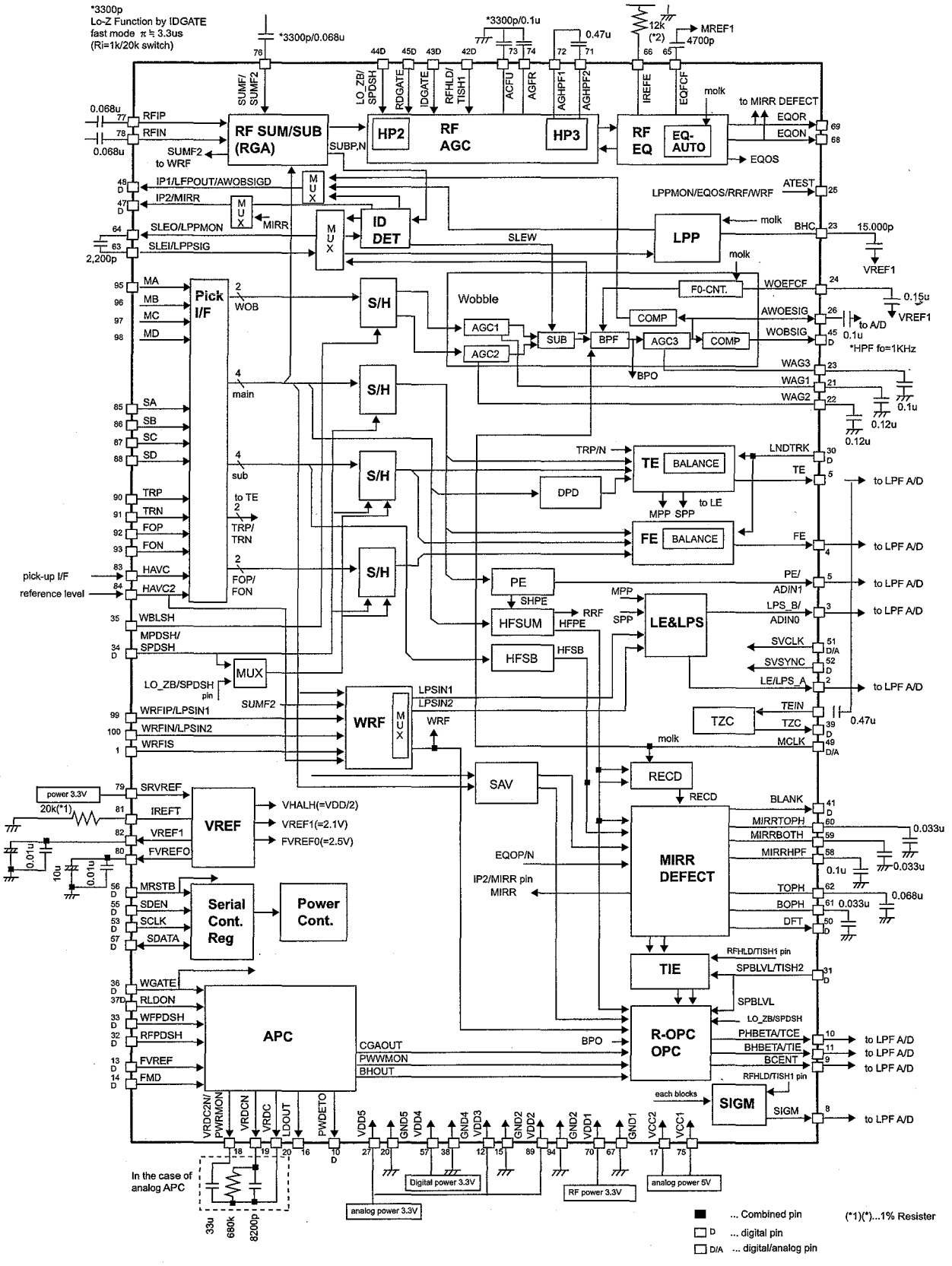
MAJOR IC INTERNAL BLOCK DIAGRAM AND PIN DESCRIPTION

IC101 (HD153722TF) : RF AMP Analog Signal Processor

Pin Assignment



Block Diagram



• Pin Description

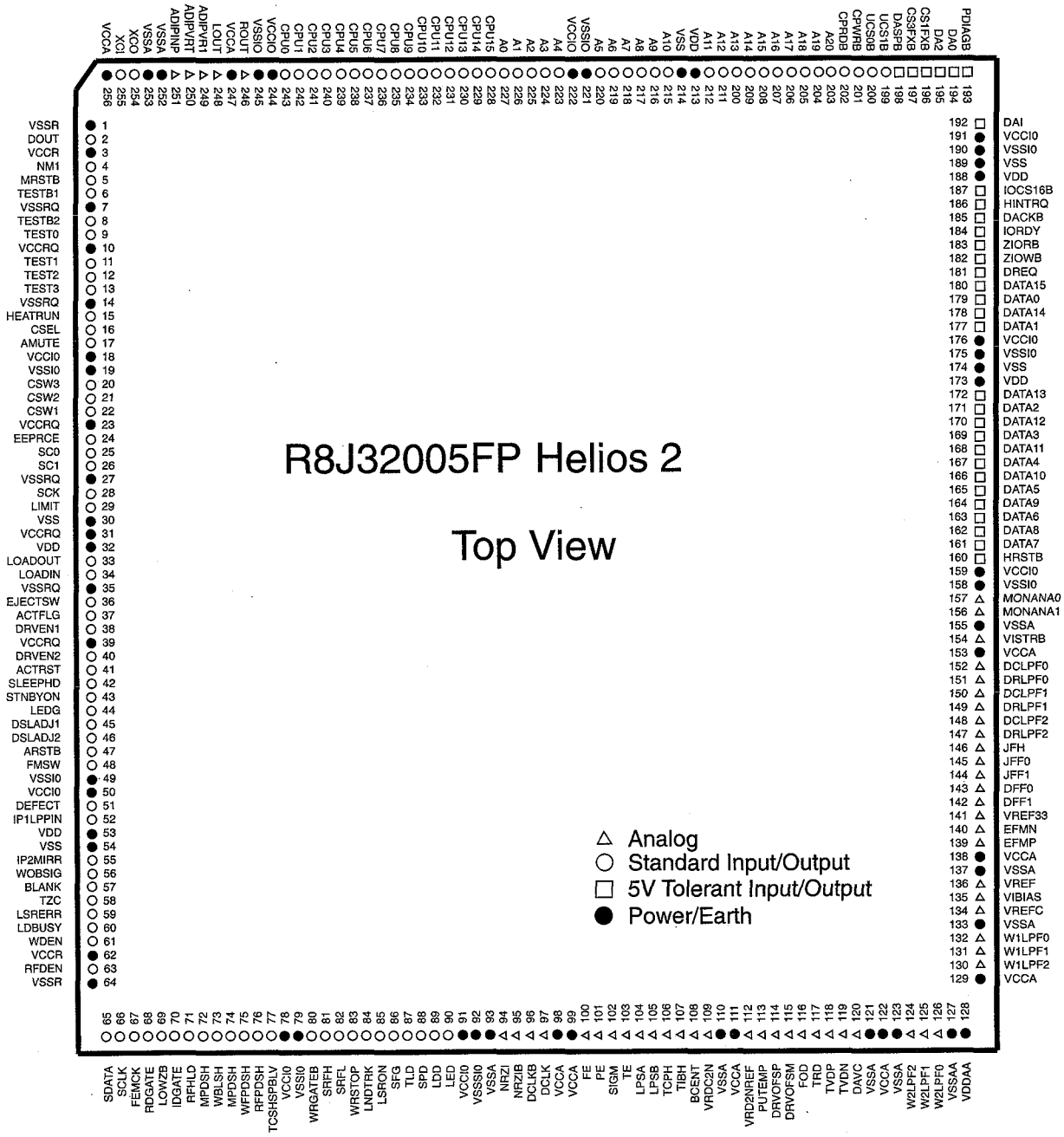
Pin no.	Pin Name	Type	Function
1	WRFIS	Analog-Input	WRF single input terminal.
2	LE/LPS_A	Analog-Output	Lens error and lens shift signal output terminal.
3	LPS_B/ADIN0	Analog-Output	Lens shift and Renesas test signal output terminal.
4	FE	Analog-Output	Focus error output terminal.
5	PE/ADIN1	Analog-Output	PE and Renesas test signal output terminal.
6	TE	Analog-Output	Tracking error output terminal.
7	TEIN	Analog-Input	TZC detectng TE signal input terminal.
8	SIGM	Analog-Output	Analog signal monitoring output terminal.
9	BCENT	Analog-Output	OPC center signal output terminal.
10	PHBETA/TCE	Analog-Output	OPC top hold level signal & APC write sampling signal output terminal / tilt servo detecting output terminal.
11	BHBETA/TIE	Analog-Output	OPC bottom hold level signal & R-OPC sampling signal output terminal / tilt servo detecting output terminal.
12	VDD3	Power	Power supply sonnected terminal(3.3V).
13	FVREF	Analog-Input	Reference voltage for APC input terminal.
14	FMD	Analog-Input	APC monitor diode input terminal.
15	GND3	Ground	Ground connection terminal.
16	LDOUT	Analog-Output	Terminal to control laser drivers for APC read system.
17	VCC2	Power	Power supply connected terminal(5V).
18	VRDC2N/PWRMON	External-capacitor required	Terminal to connect laser driver control filters for APC read / SH monitor output terminal
19	VRDCN	External-components required	Terminal to connect laser driver control filters for APC read.
20	VRDC	External-components required	Terminal to connect laser driver control filters for APC read.
21	WAG1	External-capacitor required	Terminal to connect WOBBLE AGC detector capacitor.
22	WAG2		
23	WAG3		
24	WOBFCF	External-capacitor required	OB-BPFf0 auto-adjustment external capacitor connected terminal
25	ATEST	Analog-Output	Renesas analog test signal output terminal.
26	AWOBSIG	Analog-Output	Analog-level WOBBLE signal output terminal.
27	VDD5	Power	Power supply connected terminal(3.3V).
28	BHC	External-capacitor required	External capacitor for LPP bottom hold terminal.
29	GND5	Ground	Ground connected terminal.
30	LNDTRK	Digital-Input	Balance adjustment mode selection.
31	SPBLVL/TISH2	Digital-Input	R-OPC WRF signal sampling pulse input terminal /Tilt servo detecting sampling pulse input terminal.
32	RFPDSH	Digital-Input	APC read system sampling pulse input terminal..
33	WFPDSH	Digital-Input	APC write system sampling pulse input terminal.
34	MPDSH/SPDSH	Digital-Input	Pick-Up input sampling pulse input terminal.
35	WBLSH	Digital-Input	WOBBLE sampling pulse input terminal.
36	WGATE	Digital-Input	Read/Write control input terminal.

Pin no.	Pin Name	Type	Function
37	RLDON	Digital-Input	Input terminal to control laser driver output for APC read.
38	GND4	Ground	Ground connection terminal[digital].
39	TZC	Digital-Output	Tracking zero cross signal digital output terminal.
40	PWDETO	Digital-Output	Laser diode over power detection output terminal.
41	BLANK	Digital-Output	Record/non-record detecting output terminal / BD detecting output terminal.
42	RFHLD/TISH1	Digital-Input	RF hold control signal input terminal / Tilt servo detecting sampling pulse input terminal.
43	IDGATE	Digital-Input	ID Select pulse input terminal.
44	LO_ZB/SPDSH	Digital-Input	Low-z (reversal) pulse input terminal / Pickup input sampling pulse input terminal.
45	RDGATE	Digital-Input	Read gate signal input terminal.
46	WOBSIG	Digital-Output	WOBBLE signal output terminal.
47	IP2/MIRR	Digital-Output	ID detection signal output terminal / Mirror detection output terminal.
48	IP1/LPPOUT /AWOBSIGD	Digital-Output	ID detection signal output terminal / LPP detection output terminal / AWOBSIG digital output terminal.
49	MCLK	Digital/Analog-Input	Main clock input terminal / Equalizer fc auto-adjustment control clock input terminal / LPP output pulse width control clock input terminal / WOB-BPFf0 auto-tracking clock input terminal.
50	DFT	Digital-Output	Defect detection output terminal.
51	SVCLK	Digital-Input	Renesas test input terminal
52	SVSYNC	Digital-Input	Renesas test input terminal
53	SCLK	Digital-Input	Serial I/F clock input terminal.
54	SDATA	Digital-Input/Output	Serial I/F data input/output terminal.
55	SDEN	Digital-Input	Serial I/F enable input terminal.
56	MRSTB	Digital-Input	Master-reset(reversal) input terminal.
57	VDD4	Power	power supply connected terminal(3.3V)(digital).
58	MIRRHPF	External-capacitor required	Terminal to connect Mirror envelope detector HPF capacitor.
59	MIRRBOTH	External-capacitor required	Terminal to connect Mirror envelope detector bottom hold capacitor.
60	MIRRTOPH	External-capacitor required	Terminal to connect Mirror envelope detector top hold capacitor
61	BOTH	External-capacitor required	Terminal to connect envelope bottom hold capacitor.
62	TOPH	External-capacitor required	Terminal to connect envelope top hold capacitor.
63	SUBI/LPPSIG	Analog-Input	ID detecting HPF input terminal / LPP detecting HPF input terminal.
64	SUBO/LPPMON	Analog-Output	ID dtecting HPF output terminal / LPP detecting HPF output terminal.
65	EQFCF	External-capacitor required	Terminal to connect RF-equalizer fc auto-adjustment external capacitor

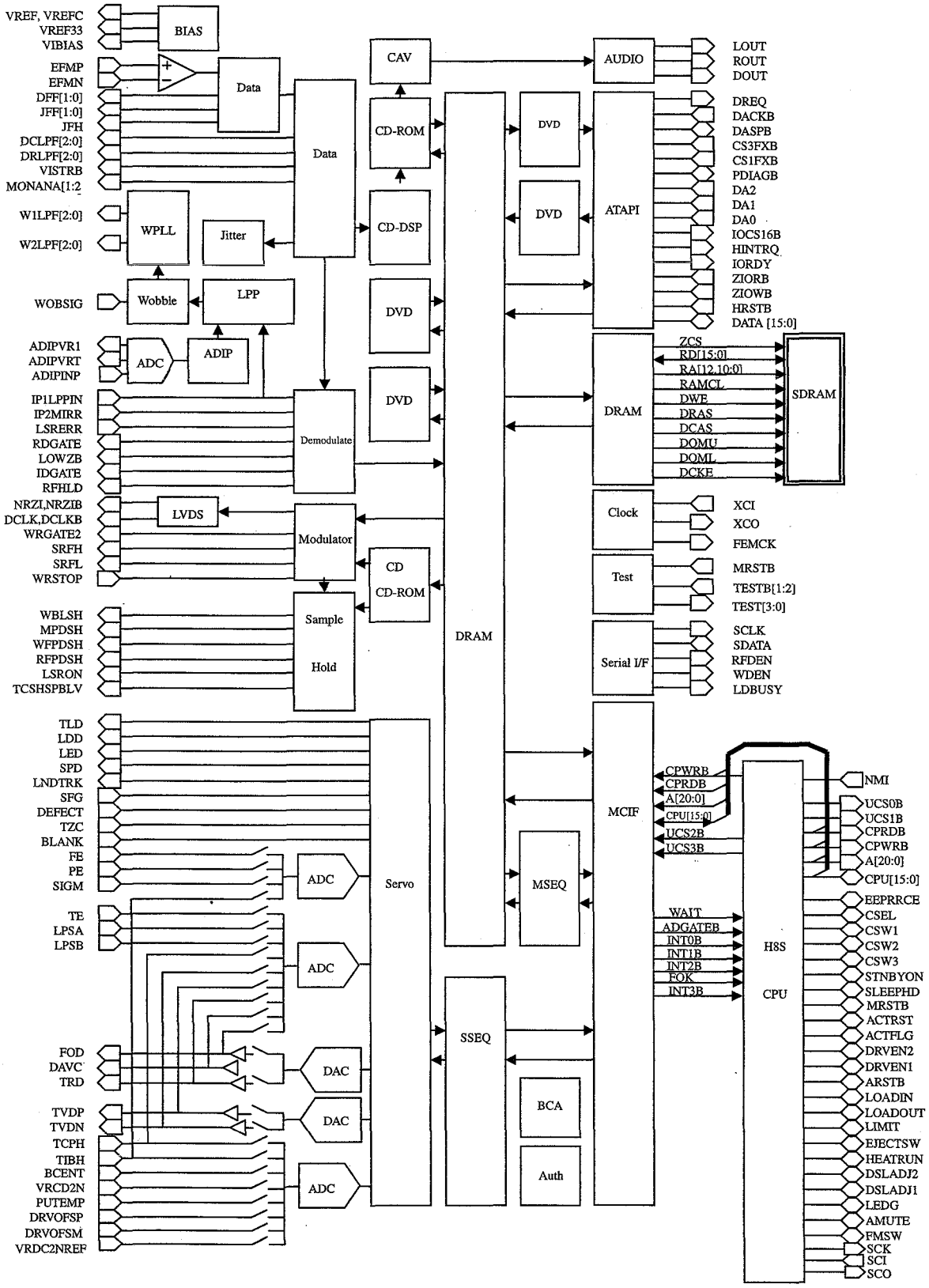
Pin no.	Pin Name	Type	Function
66	IREFE	External-resistor required	Terminal to connect RF-equalizer fc setting external resistor.
67	GND1	Ground	Ground connected terminal.
68	EQON	Differential-Output	RF Equalizer differential output terminal.
69	EQOP	Differential-Output	RF Equalizer differential output terminal.
70	VDD1	External capacitor required	Terminal to connect AGC-DET input high pass filter capacitor.
71	AGHPF2	External-capacitor required	Terminal to connect AGC high pass filter capacitor.
72	AGHPF1	External-capacitor required	Terminal to connect AGC high pass filter capacitor.
73	AGFU	External-capacitor required	AGC filter connecting terminal.
74	AGFR	External-capacitor required	AGC filter connecting terminal.
75	VCC1	power	Power suypply connected terminal(5V).
76	SUMF/SUMF2	Analog-Input/ External-capacitor required	SUM RF input/SUM differential amp DC filter connected terminal.
77	RFIP	Differential-Input	RF differential input terminal.
78	RFIN	Differential-Input	RF differential input terminal.
79	SRVREF	Analog-Input	DSP supply voltage (3.3V) input terminal.
80	FVREFO	Analog-Output	2.5V reference bias voltage output terminal.
81	IREFT	External-resistor required	Terminal to connect reference current setting external resistor.
82	VREF1	Analog-Output	2.1V reference bias voltage output terminal.
83	HAVC	Analog-Input	Pick-Up reference voltage input terminal.
84	HAVC2	Analog-Input	Pick-Up reference voltage input terminal.
85	SA	Analog-Input	Sub beam 4D input terminal.
86	SB		
87	SC		
88	SD		
89	VDD2	Power	Power supply connected terminal(3.3V)
90	TRP	Differential-Input	Tracking error differential direct input terminal.
91	TRN		
92	FOP	Differential-Input	Focus error differential direct input terminal.
93	FON		
94	GND2	Ground	Ground connected terminal.
95	MA	Analog-Input	Main beam 4D input terminal.
96	MB		
97	MC		
98	MD		
99	WRFIP/LPSIN1	Analog-Input	WRF differential/Lens shift signal input terminal.
100	WRFIN/LPSIN2	Analog-Input	WRF differential/Lens shift signal input terminal.

IC301 (R8J32005FP) : Encoder, Decoder & DSP Singal Processor

1.1 Pin Layout



1.2 Block Diagram



1.3 Pin Table

Pin No.	Pin Name
1	VSSR
2	DOUT
3	VCCR
4	NMI
5	MRSTB
6	TESTB1
7	VSSRQ
8	TESTB2
9	TEST0
10	VCCRQ
11	TEST1
12	TEST2
13	TEST3
14	VSSRQ
15	HEATRUN
16	CSEL
17	AMUTE
18	VCCIO
19	VSSIO
20	CSW3
21	CSW2
22	CSW1
23	VCCRQ
24	EEPRCE
25	SCO
26	SCI
27	VSSRQ
28	SCK
29	LIMIT
30	VSS
31	VCCRQ
32	VDD

Pin No.	Pin Name
33	LOADOUT
34	LOADIN
35	VSSRQ
36	EJECTSW
37	ACTFLG
38	DRVEN1
39	VCCRQ
40	DRVEN2
41	ACTRST
42	SLEEPHD
43	STNBYON
44	LEDG
45	DSLADJ1
46	DSLADJ2
47	ARSTB
48	FMSW
49	VSSIO
50	VCCIO
51	DEFECT
52	IP1LPPIN
53	VDD
54	VSS
55	IP2MIRR
56	WOBSIG
57	BLANK
58	TZC
59	LSRERR
60	LDBUSY
61	WDEN
62	VCCR
63	RFDEN
64	VSSR

Pin No.	Pin Name
65	SDATA
66	SCLK
67	FEMCK
68	RDGATE
69	LOWZB
70	IDGATE
71	RFHLD
72	WRGATE2
73	WBLSH
74	MPDSH
75	WFPDSH
76	RFPDSH
77	TCSHSPBLV
78	VCCIO
79	VSSIO
80	WRGATEB
81	SRFH
82	SRFL
83	WRSTOP
84	LNDTRK
85	LSRON
86	SFG
87	TLD
88	SPD
89	LDD
90	LED
91	VCCIO
92	VSSIO
93	VSSA
94	NRZI
95	NRZIB
96	DCLKB

Pin No.	Pin Name
97	DCLK
98	VCCA
99	VCCA
100	FE
101	PE
102	SIGM
103	TE
104	LPSA
105	LPSB
106	TCPH
107	TIBH
108	BCENT
109	VRDC2N
110	VSSA
111	VCCA
112	VRDC2NREF
113	PUTEMP
114	DRVOFSP
115	DRVOFSM
116	FOD
117	TRD
118	TVDP
119	TVDN
120	DAVC
121	VSSA
122	VCCA
123	VSSA
124	W2LPF2
125	W2LPF1
126	W2LPF0
127	VSSAA
128	VDDAA

Pin No.	Pin Name
129	VCCA
130	W1LPF2
131	W1LPF1
132	W1LPF0
133	VSSA
134	VREFC
135	VIBIAS
136	VREF
137	VSSA
138	VCCA
139	EFMP
140	EFMN
141	VREF33
142	DFF1
143	DFF0
144	JFF1
145	JFF0
146	JFH
147	DRLPF2
148	DCLPF2
149	DRLPF1
150	DCLPF1
151	DRLPF0
152	DCLPF0
153	VCCA
154	VISTRB
155	VSSA
156	MONANA1
157	MONANA0
158	VSSIO
159	VCCIO
160	HRSTB

Pin No.	Pin Name
161	DATA7
162	DATA8
163	DATA6
164	DATA9
165	DATA5
166	DATA10
167	DATA4
168	DATA11
169	DATA3
170	DATA12
171	DATA2
172	DATA13
173	VDD
174	VSS
175	VSSIO
176	VCCIO
177	DATA1
178	DATA14
179	DATA0
180	DATA15
181	DREQ
182	ZIOWB
183	ZIORB
184	IORDY
185	DACKB
186	HINTRQ
187	IOCS16B
188	VDD
189	VSS
190	VSSIO
191	VCCIO
192	DA1

Pin No.	Pin Name
193	PDIAGB
194	DA0
195	DA2
196	CS1FXB
197	CS3FXB
198	DASPB
199	UCS1B
200	UCS0B
201	CPWRB
202	CPRDB
203	A20
204	A19
205	A18
206	A17
207	A16
208	A15
209	A14
210	A13
211	A12
212	A11
213	VDD
214	VSS
215	A10
216	A9
217	A8
218	A7
219	A6
220	A5
221	VSSIO
222	VCCIO
223	A4
224	A3

Pin No.	Pin Name
225	A2
226	A1
227	A0
228	CPU15
229	CPU14
230	CPU13
231	CPU12
232	CPU11
233	CPU10
234	CPU9
235	CPU8
236	CPU7
237	CPU6
238	CPU5
239	CPU4
240	CPU3
241	CPU2
242	CPU1
243	CPU0
244	VCCIO
245	VSSIO
246	ROUT
247	VCCA
248	LOUT
249	ADIPVR1
250	ADIPVRT
251	ADIPINP
252	VSSA
253	VSSA
254	XCO
255	XCI
256	VCCA

1.4 Pin Functions

It corresponds to the following signs as a pin I/O specification.

AI : Analog Input
AO : Analog Output
AIO : Analog Input/Output
I : Standard Input
IU : Standard Input with Pull Up
O : Standard Output
TO : Standard Three State Output
IO : Standard Input/Output
IOU : Standard Input/Output with Pull Up
5I : 5V Tolerant Input
5O : 5V Tolerant Output
5TO : 5V Tolerant Three State Output
5IO : 5V Tolerant Input/Output
PW : Power Supply Pin
GND : Ground Pin

1.4.1 Data Strobe Pin List

(a) Slicer/DPLL Pin List

Pin Name	Pin No.	I/O	Destination	Function
EFMP	139	AI	AFE	RF signal normal phase input pin
EFMN	140			RF signal counter phase input pin
VREF33	141	AO	External Capacitor	Reference voltage (Vcc/2) output pin
DFF1	142	AO	External Capacitor	DutyFeedBack LPF connect pin
DFF0	143			
JFF1	144	AO	External Components	JitterFeedBack LPF connect pin
JFF0	145			
JFH	146	AO	External Capacitor	JitterFeedBack BPF connect pin
DRLPF2	147	AO	External Components	DPLL filter connect pin (2-2)
DCLPF2	148			DPLL filter connect pin (2-1)
DRLPF1	149			DPLL filter connect pin (1-2)
DCLPF1	150			DPLL filter connect pin (1-1)
DRLPF0	151			DPLL filter connect pin (0-2)
DCLPF0	152			DPLL filter connect pin (0-1)
VISTRB	154	AO	External Resistor	DPLL Vco VI conversion resistor connect pin
MONANA1	156	AO	External Components	Analog monitor 1 (Slice Offset adjustment (jitter))
MONANA0	157			Analog monitor 0 (Slice Offset adjustment (duty cycle))

(b) Wpll/Bias Pin List

Pin Name	Pin No.	I/O	destination	Function
W2LPF2	124	AO	External Components	Write PLL2 filter connect pin (2)
W2LPF1	125			Write PLL2 filter connect pin (1)
W2LPF0	126			Write PLL2 filter connect pin (0)
W1LPF2	130	AO	External Components	Write PLL1 filter connect pin (2)
W1LPF1	131			Write PLL1 filter connect pin (1)
W1LPF0	132			Write PLL1 filter connect pin (0)
VREFC	134	AO	External Capacitor	Reference voltage (1.65 V) output pin
VREF	136			
VIBIAS	135	AO	External Resistor	Resistor connect pin for reference current generation

1.4.2 Servo Pin List

Pin Name	Pin No.	I/O	Destination	Function
DEFECT	51	I	AFE	Defect (scratch detect) signal
BLANK	57	I	AFE	Blank signal input (also connected to the H8S interrupt port INT5)
TZC	58	I	AFE	Tracking Zero Crossing signal input
SFG	86	IU	DRVR	Spindle FG pulse (also input to the H8S interrupt port INT4)
TLD	87	TO	DRVR	Tilt drive signal (PWM output)
SPD	88	TO	DRVR	Spindle drive signal (PWM output)
LDD	89	TO	DRVR	Loading drive signal (PWM output)
LED	90	TO	PU	LPS_LED control signal (PWM output)
FE	100	AI	AFE	Focus error: sampled at 352.8 kHz
PE	101	AI	AFE	Laser power error: sampled at 176.4 kHz
SIGM	102	AI	AFE	Signal monitor: sampled at 176.4 kHz
TE	103	AI	AFE	Tracking error: sampled at 352.8 kHz
LPSA	104	AI	AFE	Lens positioning/lens error: sampled at 88.2 kHz
LPSB	105	AI	AFE	Lens positioning B: sampled at 88.2 kHz
TCPH	106	AI	AFE	Tracking center/BETA top hold: sampled at 44.1/176.4 kHz
TIBH	107	AI	AFE	Tilt error/BETA bottom hold: sampled at 44.1/176.4 kHz
BCENT	108	AI	AFE	BETA center: sampled at 176.4 kHz
VRDC2N	109	AI	AFE	APC read system laser driver control pin: sampled at 176.4 kHz
VRDC2NREF	112	AI	OP Amp	APC reference voltage input: sampled at 88.2 kHz
PUTEMP	113	AI	PU	Pick-up temperature monitor input: sampled at 88.2 kHz
DRVOFSP DRVOFSM	114 115	AI	DRVR	Driver offset adjustment input (plus/minus) sampled at 88.2 kHz
FOD	116	AO	DRVR	Focus control signal
TRD	117	AO	DRVR	Tracking control signal
TVDP TVDN	118 119	AO	DRVR	Sled drive signal (normal phase) Sled drive signal (counter phase)
DAVC	120	AO	DRVR	Servo system Vcc/2 voltage output pin

1.4.3 ATAPI Interface Pin List

Pin Name	Pin No.	I/O	Destination	Function
HRSTB	160	5I	ATAPI	ATAPI IF control signal (host reset signal)
DA2 DA1 DA0	195 192 194	5I	ATAPI	ATAPI IF register address signal
DATA[15:0]	180, 178, 172, 170, 168, 166, 164, 162, 161, 163, 165, 167, 169, 171, 177, 179,	5IO	ATAPI	ATAPI IF data bus
DREQ	181	5TO	ATAPI	ATAPI IF DMA request signal
ZIOWB	182	5I	ATAPI	ATAPI IF write strobe pulse
ZIORB	183	5I	ATAPI	ATAPI IF read strobe pulse
IORDY	184	5TO	ATAPI	ATAPI IF control signal (drive Ready)
DACKB	185	5I	ATAPI	ATAPI IF DMA acknowledge
HINTRQ	186	5TO	ATAPI	ATAPI IF drive interrupt signal
IOCS16B	187	5TO	ATAPI	ATAPI IF control signal (16-bit transfer)
PDIAGB	193	5IO	ATAPI	ATAPI IF control signal
CS1FXB CS3FXB	196 197	5I	ATAPI	ATAPI IF register chip select signal
DASPB	198	5IO	ATAPI	ATAPI IF control signal

1.4.4 Encoder Interface Pin List

Pin Name	Pin No.	I/O	Destination	Function
IP1LPPIN	52	I	AFE	PID area identification signal/LPP input signal
IP2MIRR	55	I	AFE	PID area identification signal/MIRR signal
WOBSIG	56	I	AFE	Wobble signal input
LSRERR	59	I	AFE	Laser error signal
RDGATE	68	O	AFE	PLL input switch signal
LOWZB	69	O	AFE	Input impedance switch control signal/SPDSH; running OPC sampling pulse (Pit top)
IDGATE	70	O	AFE	ID/data switch signal/wobble signal sampling pulse 2
RFHLD	71	O	AFE	VFO3 holding signal and track center signal sample & hold signal
WRGATE2	72	O	AFE	Write gate signal output
WBLSH	73	O	AFE	Wobble signal sampling pulse
MPDSH	74	O	AFE	Main beam sampling pulse
WFPDSH	75	O	AFE	Laser control sampling pulse (Front monitor write/erase block)
RFPDSH	76	O	AFE	Laser control sampling pulse (Front monitor read block)
TCSHSPBLV	77	O	AFE	VFO1 track center signal sample & hold pulse/SPBLVL; running OPC sampling pulse (Pit end)
WRGATEB	80	O	PU	Write gate signal
SRFH SRFL	81 82	O	PU	I- V amplifier gain switch (HI side)/I- V amplifier gain switch (for binary)) I- V amplifier gain switch (Low side)
WRSTOP	83	I	PU	Write stop gate signal
LNDTRK	84	O	AFE/PU	Land/groove switch
LSRON	85	O	AFE	Laser ON/OFF signal (with internal control)
NRZI NRZIB	94 95	AO	PU	NRZI output after modulation (normal phase) NRZI output after modulation (counter phase)
DCLKB DCLK	96 97	AO	PU	NRZI sync clock (counter phase) NRZI sync clock (normal phase)
ADIPVR1	249	AO	External Components	AD related pin for ADIP detection
ADIPVRT	250	AO	External Components	AD related pin for ADIP detection
ADIPINP	251	AI	AFE	ADIP detect input pin

1.4.5 Serial Communication Interface Pin List

Pin Name	Pin No.	I/O	Destination	Function
LDBUSY	60	I	LDD	LDD serial IF busy
WDEN	61	O	LDD	LDD microcomputer I/F (transfer enable signal)
RFDEN	63	O	AFE	AFE/LDD microcomputer I/F (transfer enable signal)
SDATA	65	IO	AFE / LDD	AFE/LDD microcomputer I/F (transfer data signal 3V system)
SCLK	66	O	AFE / LDD	AFE/LDD microcomputer I/F (transfer clock signal)

1.4.6 Audio Interface Pin List

Pin Name	Pin No.	I/O	Destination	Function
DOUT	2	TO	ATAPI	Digital output pin
ROUT LOUT	246 248	AO	ATAPI	Audio Lch & Rch output

1.4.7 Clock Generator Pin List

Pin Name	Pin No.	I/O	Destination	Function
FEMCK	67	O	AFE	Front End LSI clock
XCO	254	O	X'TAL	Crystal oscillation 33.8688 MHz
XCI	255	I	X'TAL	Crystal oscillation 33.8688 MHz

1.4.8 H8S Micro-Processor Pin List
(a) CPU

Pin Name	Pin No.	I/O	Destination	Function
HEATRUN	15	IO	ATAPI	CPU general port 1-0: Off heat run test input
CSEL	16	IO	ATAPI	CPU general port 1-6: ATAPI CSEL
AMUTE	17	IO	Audio Mute ckt	CPU general port 0-2: Audio mute
CSW3	20	IO		CPU general port 1-7: Cartridge detect signal 3
CSW2	21	IO		CPU general port 0-0: Cartridge detect signal 2
CSW1	22	IO		CPU general port 0-1: Cartridge detect signal 1
EEPRCE	24	IO	EEPROM	CPU general port 1-5: EEPROM chip select
SCO	25	O	EEPROM	CPU dedicated port (SCI) : Serial data output
SCI	26	I	EEPROM	CPU dedicated port (SCI) : Serial data input
SCK	28	O	EEPROM	CPU dedicated port (SCI) : Serial clock output
LIMIT	29	IO	Slider Limit Switch	CPU general port 2-7: Slider inner track limit SW
LOADOUT	33	IO	Load Switch	CPU general port 2-6: Loader out sensor
LOADIN	34	IO	Load Switch	CPU general port 2-5 (also connected to the CPU interrupt port INT8) : Loader in sensor
EJECTSW	36	IO	Eject Switch	CPU interrupt port INT6: EJECTSW interrupt request
ACTFLG	37	IU	DRVR	CPU interrupt port INT7: Pick up protect flag
DRVEN1	38	IO	DRVR	CPU general port 0-7: 6ch driver control 1
DRVEN2	40	IO	DRVR	CPU general port 0-6: 6ch driver control 2
ACTRST	41	IO	DRVR	CPU general port 0-5: Pick up protect reset
SLEEPHD	42	IO	PU	CPU general port 0-4: LDD Sleep control
STNBYON	43	IO	PU	CPU general port 2-4: Wake Up signal
LEDG	44	IO	LED	CPU general port 1-4: LED (green) on
DSLADJ1	45	IO	Analog Switch	CPU general port 1-2: AFE ADJ output 1
DSLADJ2	46	IO	Analog Switch	CPU general port 1-1: AFE ADJ output 2
ARSTB	47	IO	AFE	CPU general port 0-3: AFE MRSTB output
FMSW	48	IO	PU	CPU general port 1-3: Front monitor

(b) Flash/SRAM

Pin Name	Pin No.	I/O	Destination	Function
UCS1B	199	IO	SRAM	H8S/CS1, also functions as the CPU general port 2- 0
UCS0B	200	IO	Flash	H8S/CS0
CPWRB	201	IO	Flash/SRAM	H8S/WRB
CPRDB	202	IO	Flash/SRAM	H8S/RDB
A[20]	203	IO	Flash/SDRAM	H8S/A[20]
A[19:17]	204, 205	O		H8S/A[19:17]
	206			
A[16:0]	207, 208	IO		H8S/A[16:0]
	209, 210			
	211, 212			
	215, 216			
	217, 218			
	219, 220			
	223, 224			
	225, 226			
	227			
CPU[15:0]	228, 229	IO	Flash/SDRAM	H8S/D[15:0]
	230, 231			
	232, 233			
	234, 235			
	236, 237			
	238, 239			
	240, 241			
	242, 243			

1.4.9 LSI/TEST Control Pin List

Pin Name	Pin No.	I/O	Destination	Function
NMI	4	I	ROMICE	Non-maskable CPU interrupt port (sensed at the falling edge)
MRSTB	5	I	RESET IC	Master reset input
TESTB1 TESTB2	6 8	I		Test select
TEST0 TEST1 TEST2 TEST3	9 11 12 13	IO		User test/CPU general port 2 Test monitor can be set as the following table by a register.

T*SEL[3:0]	TEST0	TEST1	TEST2	TEST3	Remarks
0	Servo monitor 0	Servo monitor 1	Servo monitor 2	Servo monitor 3	
1	Data strobe 0	Data strobe 1	Data strobe 2	Data strobe 3	
2	Audio 0	Audio 1	Audio 2	Audio 3	
3	DVD modulation 0	DVD modulation 1	DVD modulation 2	DVD modulation 3	
4	DVD-R/CD-R monitor 0	DVD-R/CD-R monitor 1	DVD-R/CD-R monitor 2	DVD-R/CD-R monitor 3	
5	DVD+RW monitor 0	DVD+RW monitor 1	DVD+RW monitor 2	DVD+RW monitor 3	
6	PI/C1	PI/C1	PI/C1	PI/C1	
7	PO/C2	PO/C2	PO/C2	PO/C2	
8	SLOCK	SLOCK	SLOCK	SLOCK	
9	DSYNC	DSYNC	DSYNC	DSYNC	
10	CLVCK	CLVCK	CLVCK	CLVCK	
11	BLEND	BLEND	BLEND	BLEND	
12	SYWINCOR	SYWINCOR	SYWINCOR	SYWINCOR	
13	PLL HIGH	PLL HIGH	PLL HIGH	PLL HIGH	
14	RAMCON monitor 0	RAMCON monitor 1	RAMCOM monitor 2	RAMCON monitor 3	
15	MIF monitor 0	MIF monitor 1	MIF monitor 2	MIF monitor 3	
16	WOBREF monitor 0	WOBREF monitor 1	WOBREF monitor 2	WOBREF monitor 3	

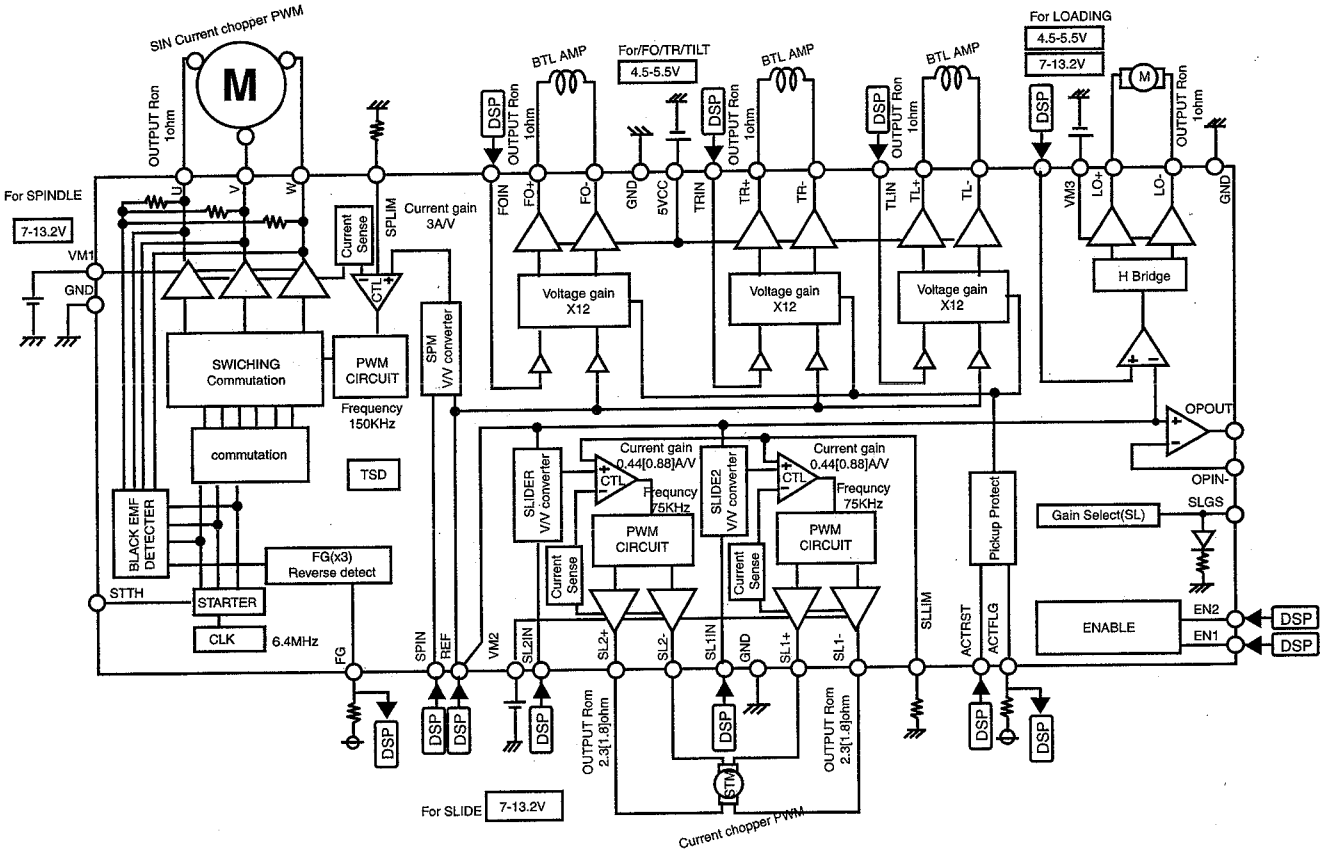
* T*SEL can be set for each of pins TEST3, TEST2, TEST1, and TEST0, respectively.

1.4.10 Power Supply/GND Pin List

Pin Name	Pin No.	I/O	Function
VDD	32, 53, 173, 188, 213	PW	DSP core power supply (1.5V)
VCCR	3, 62	PW	SDRAM power supply (3.3V)
VCCRQ	10, 23, 31, 39.	PW	SDRAM I/O power supply (3.3V)
VDDAA	128	PW	1.5V system analog power supply (1.5V) WPLL1, 2
VCCA	98	PW	Analog power supply (3.3V) : Dedicated for LVDS
	99		Analog power supply (3.3V) : Servo A/D
	111		Analog power supply (3.3V) : Servo D/A
	122		Analog power supply (3.3V) : WPLL2
	129		Analog power supply (3.3V) : WPLL1 + BIAS
	138		Analog power supply (3.3V) : SLICE
	153		Analog power supply (3.3V): DPLL
	247		Analog power supply (3.3V): AUDIO/ADIP
	256		Analog power supply (3.3V): PLL multiplication
VCCIO	18, 50, 78, 91, 159, 176, 191, 222, 244	PW	DSP I/O power supply (3.3V)
VSS	30, 54, 174, 189, 214	GND	DSP core GND
VSSR	1, 64	GND	SDRAM GND
VSSRQ	7, 14, 27, 35	GND	SDRAM I/O GND
VSSA	93,	GND	Analog GND: LVDS
	110,		Analog GND: Servo A/D
	121,		Analog GND: Servo D/A
	123,		Analog GND: WPLL2
	133,		Analog GND: WPLL1 + BIAS
	137,		Analog GND: SLICE
	155,		Analog GND: DPLL
	252,		Analog GND: AUDIO/ADIP
	253		Analog GND: PLL multiplication
VSSAA	127	GND	1.5V system analog GNDWPLL1, 2
VSSIO	19, 49.79, 92.158, 175, 190, 221.245	GND	DSP I/O GND

IC601 (M63041AFP) : SPINDLE MOTOR AND 6CH ACTUATOR DRIVER

Block Diagram



Pin Function

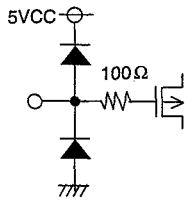
No	Pin name	Function
1	SPIN	Spindle control voltage input
2	SL1IN	Slide control voltage input1
3	SL2IN	Slide control voltage input2
4	SPLIM	Input terminal for spindle current limit
5	VM2	Motor Power Supply 2(for Slide)
6	SL2+	Slide non-inverted output2
7	GND	GND
8	SL2-	Slide inverted output2
9	SL1+	Slide non-inverted output1
10	SL1-	Slide inverted outptut1
11	GND	GND
12	U	Motor drive output U
13	V	Motor drive output V
14	W	Motor drive output W
15	ACTFLG	Pickup protect flag output
16	OPOUT	Operational amplifier output
17	OPIN-	Operational amplifier inverted input *1
18	SLLIM	Input terminal for slide current limit
19	FG	Frequency generator output
20	EN1	Input terminal for enable 1
21	EN2	Input terminal for enable 2

No	Pin name	Function
42	REF	Reference voltage input
41	LOIN	Loading control input
40	FOIN	Focus control voltage input
39	TOIN	Tracking control voltage input
38	TLIN	Tilt control voltage input
37	TL-	Tilt inverted output
36	TL+	Tilt non-inverted output
35	FO-	Focus inverted output
34	FO+	Focus non-inverted output
33	GND	GND
32	5VCC	5V Power Supply (for FS,TS,TL)
31	TO+	Tracking non-inverted output
30	TO-	Tracking inverted output
29	GND	GND
28	LO-	Loading inverted outptut
27	LO+	Loading non-inverted output
26	VM3	Power Supply3(for Loading)
25	ACTRST*2	Pickup protect Reset *2
24	STTH	Reference voltage for spindle start up
23	SLGS	Input terminal for gain select SL
22	VM1	Motor Power Supply 1(for Spindle)

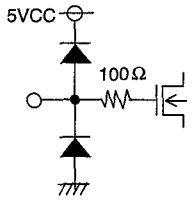
*1) Please connect 17terminal (OPIN-) to GND, when the OPamp is not used.
*2) Please connect 25terminal(ACTRST) to 5VCC, When the Pick-up protection circuit is not used.

Input/Output circuit diagram

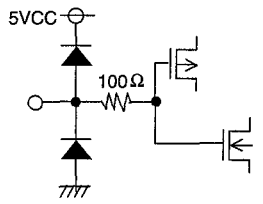
● SPIN, SL1IN, SL2IN
LOIN



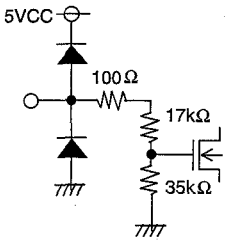
● FOIN, TOIN, TLIN
OPIN-



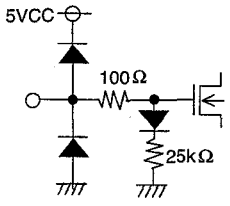
● REF



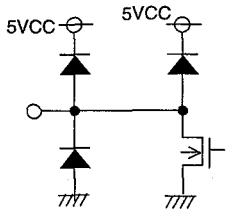
● EN1, EN2



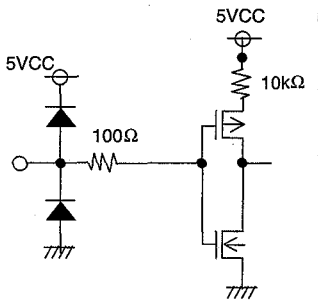
● SLGS



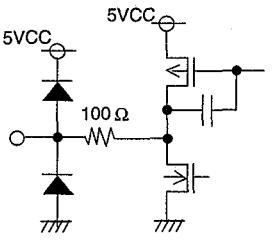
● ACTFLG, FG



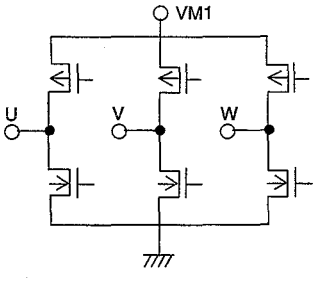
● ACTRST



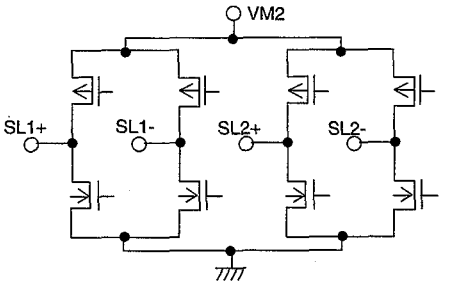
● OPOUT



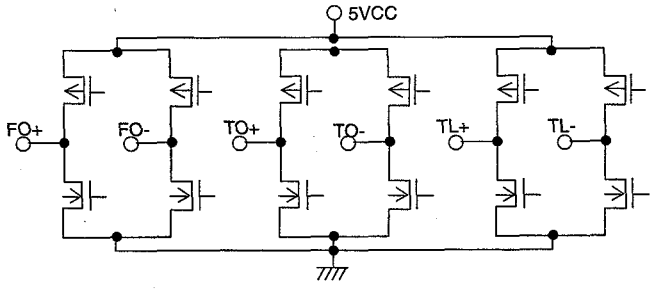
● VM1, U, V, W



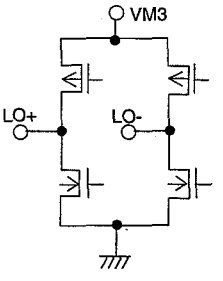
● VM2, SL1+, SL1-, SL2+, SL2-



● 5VCC, FO+, FO-, TO+, TO-, TL+, TL-

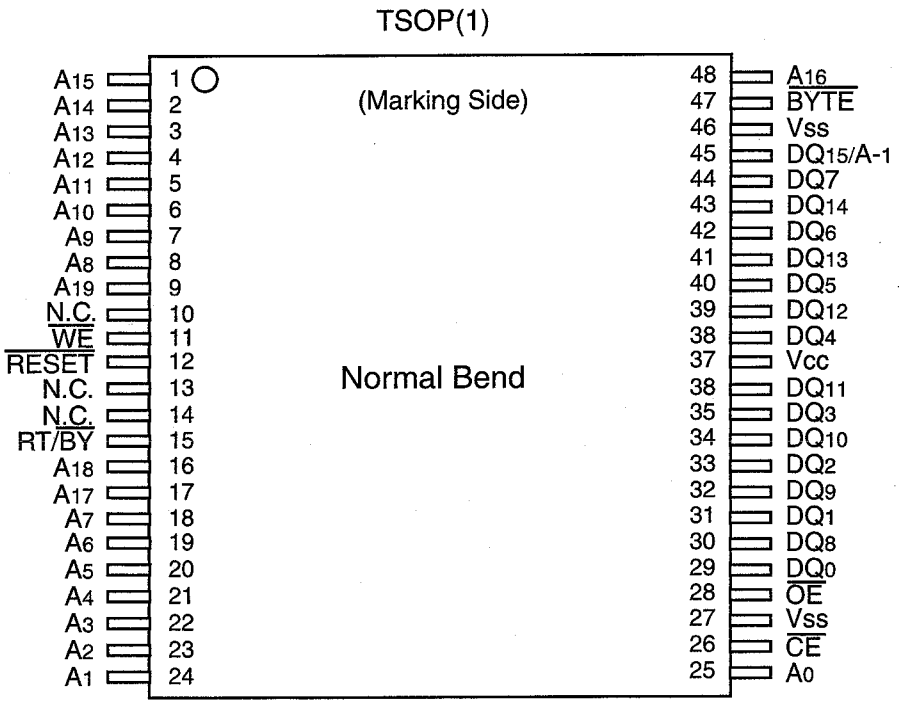


● VM3, LO+, LO-

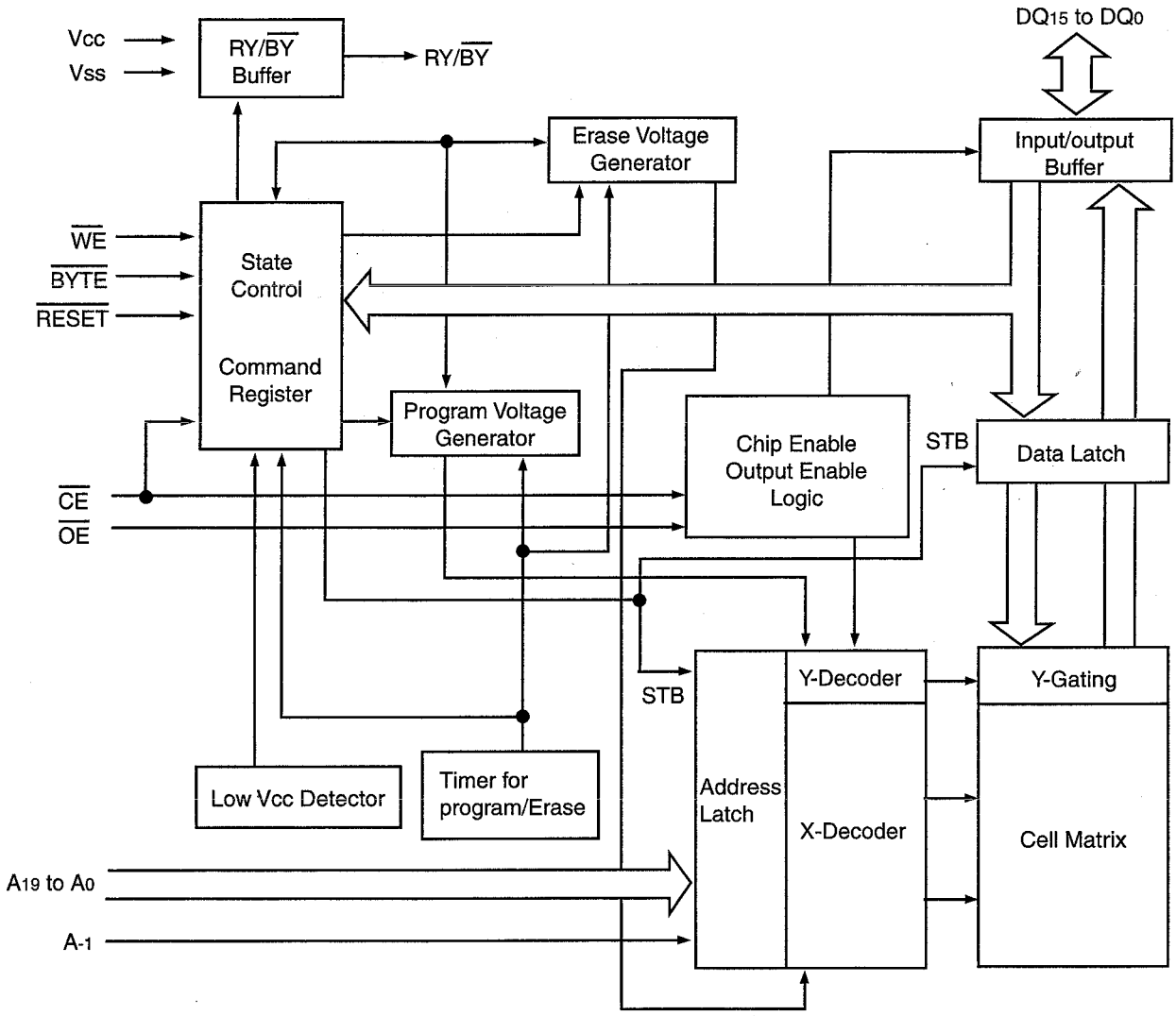


IC302 (MBM29LV160BE) : Flash Memory

Pin Assignment



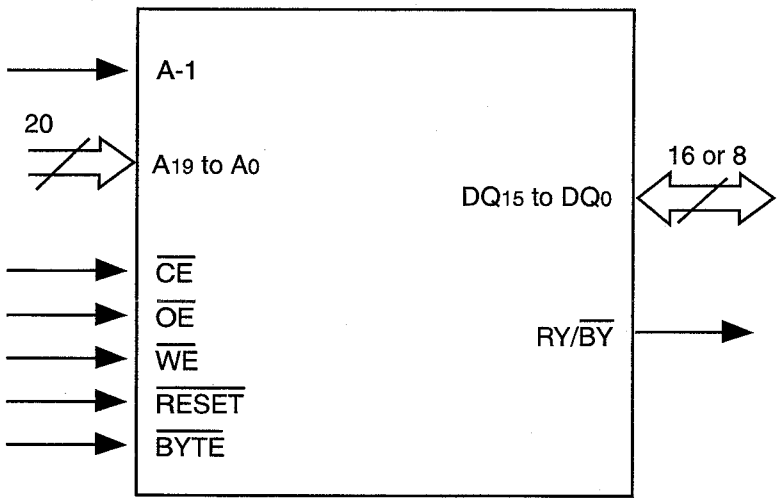
Block Diagram



• Pin Description

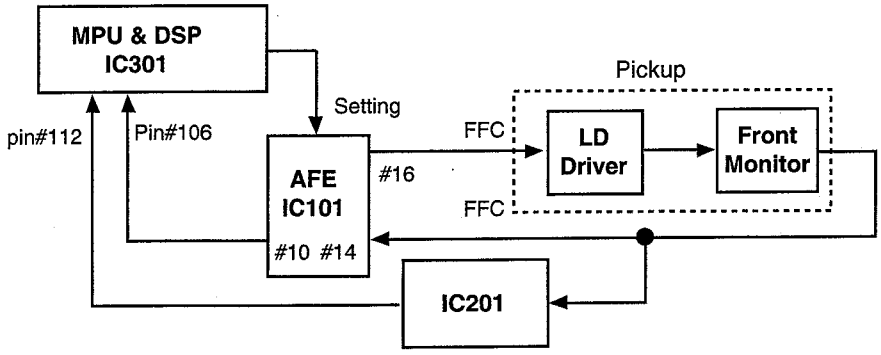
Pin	Function
A_{19} to A_0, A_{-1}	Address Inputs
DQ_{15} to DQ_0	Data Inputs/Outputs
$\overline{CE}$	Chip Enable
$\overline{OE}$	Output Enable
$\overline{WE}$	Write Enable
RY/$\overline{BY}$	Ready/Busy Output
$\overline{RESET}$	Hardware Reset Pin/ Temporary Sector Unprotection
$\overline{BYTE}$	Select 8-bit or 16-bit mode
N.C.	Pin Not Connected Internally
Vss	Device Ground
Vcc	Device Power Supply

• Logic Symbol

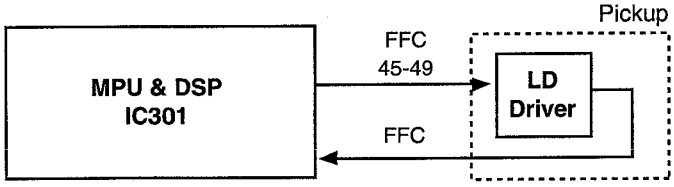


TROUBLESHOOTING GUIDE

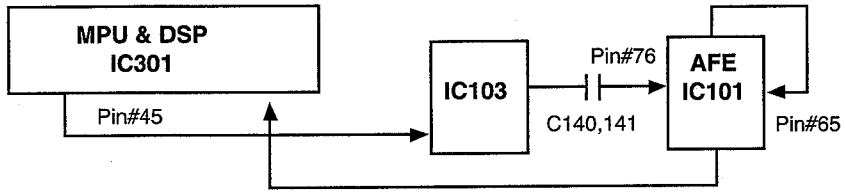
(01) Laser Power Adjust (using RD Power/WR Power/Erase Power)



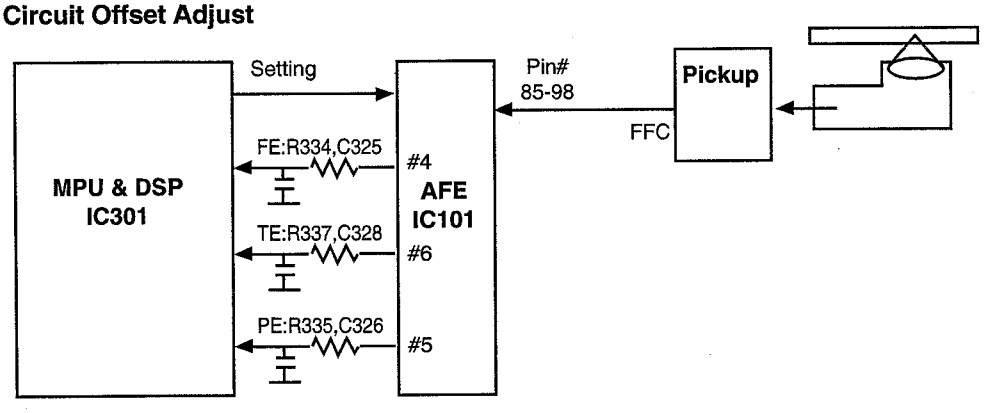
(02) High Frequency/NRZI skew Adjust



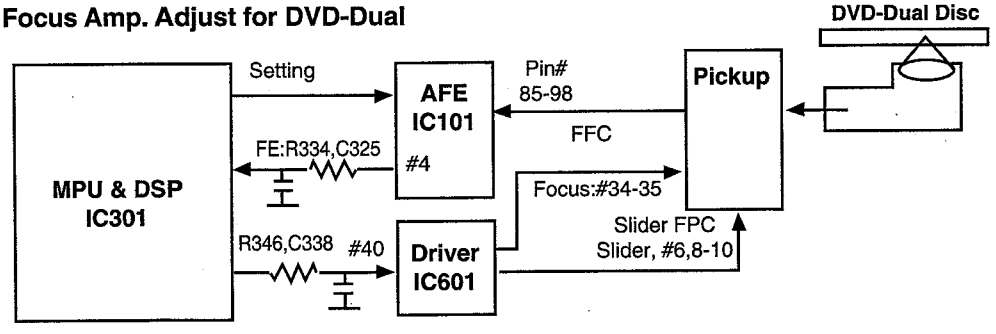
(03) Data Slice/Equalizer Boost/Raw Slice/ Equalizer Frequency Adjust



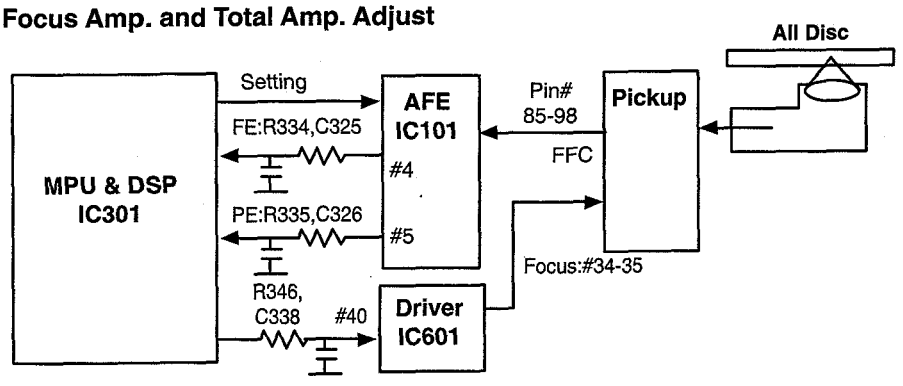
(04) Circuit Offset Adjust



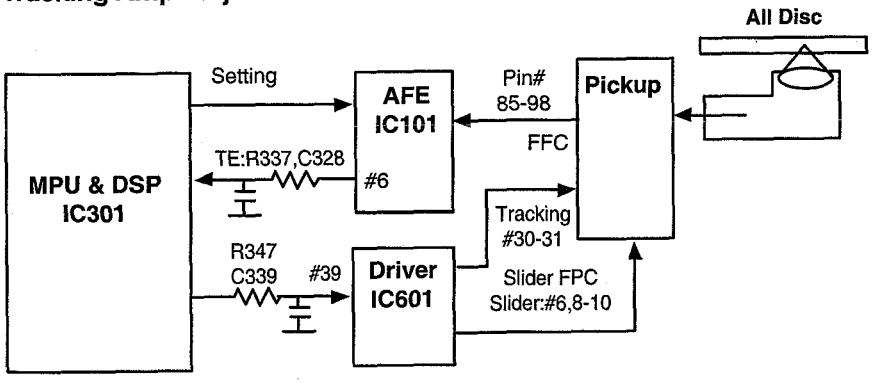
(05) Focus Amp. Adjust for DVD-Dual



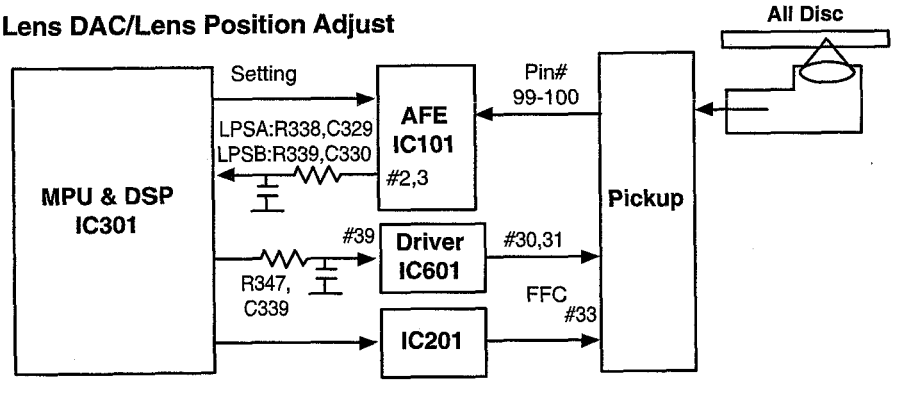
(06) Focus Amp. and Total Amp. Adjust



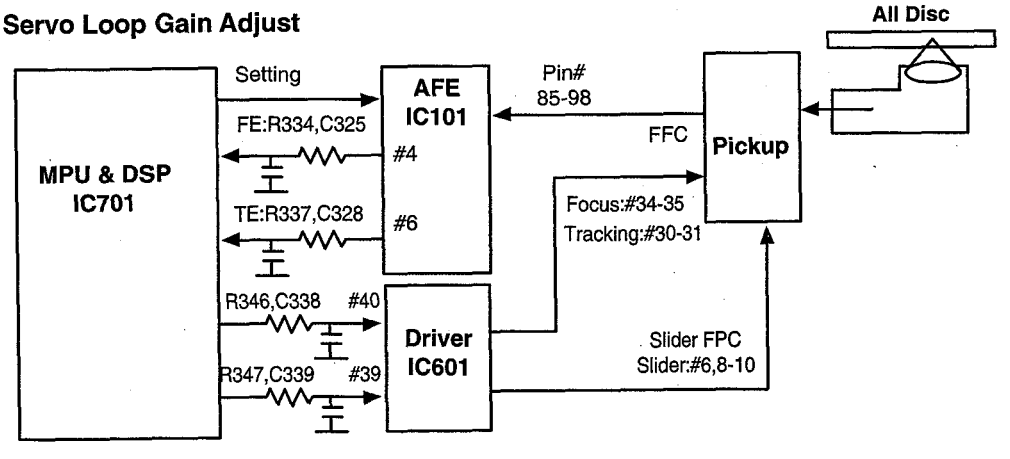
(07) Tracking Amp. Adjust



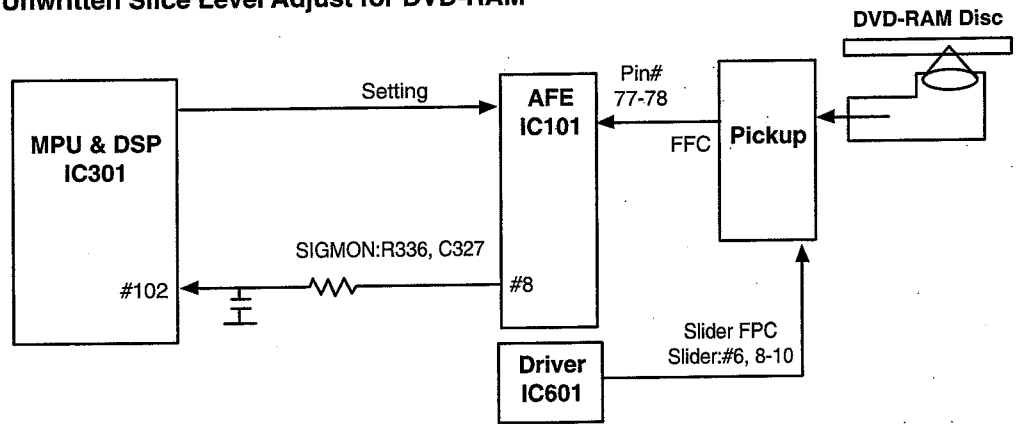
(08) Lens DAC/Lens Position Adjust



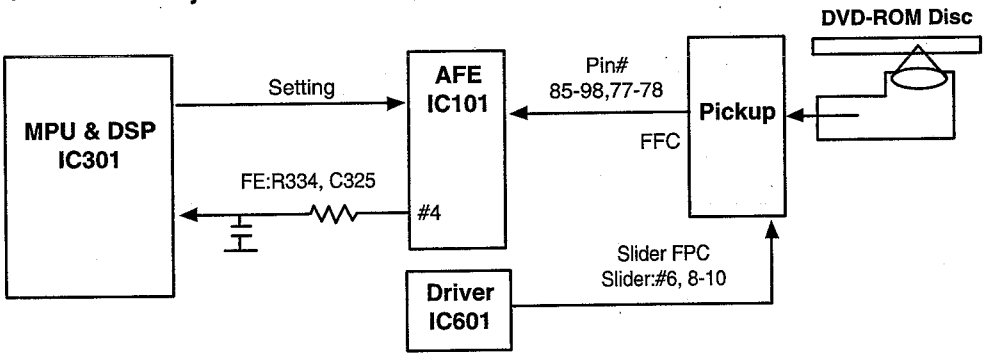
(09) Servo Loop Gain Adjust



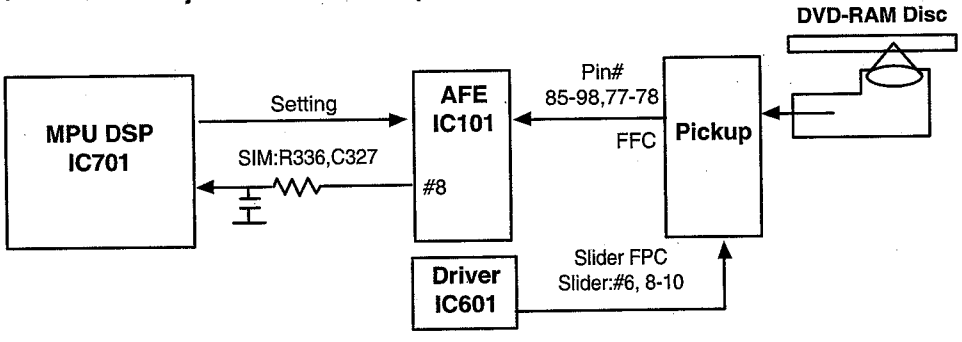
(10) Unwritten Slice Level Adjust for DVD-RAM



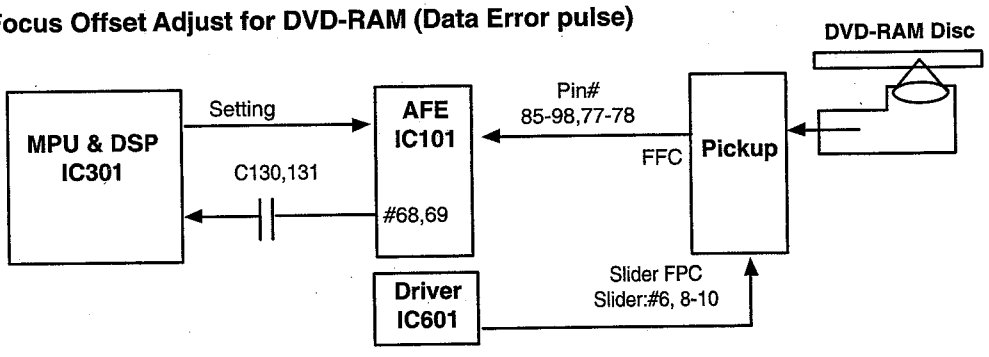
(11) Focus Offset Adjust for DVD-ROM, CD-R/RW



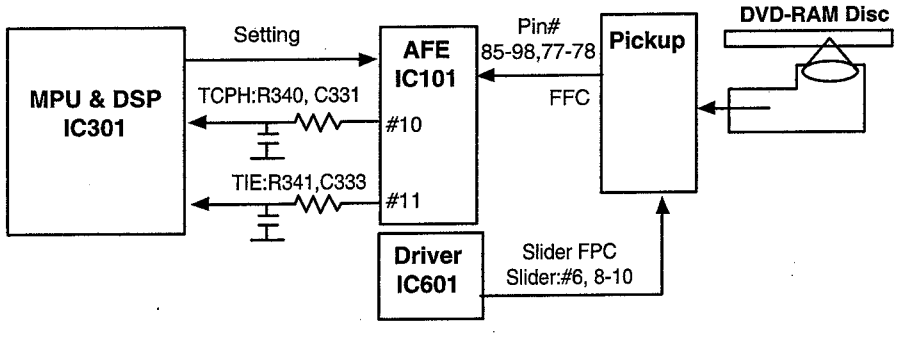
(12) Focus Offset Adjust for DVD-RAM (PID Amp)



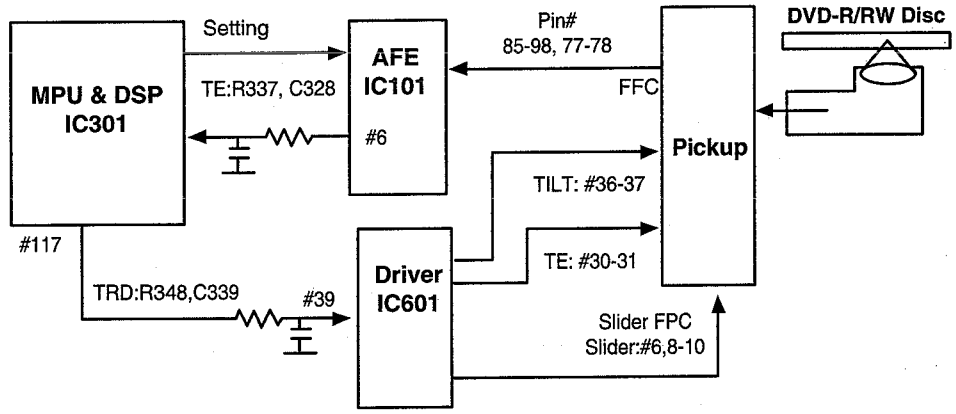
(13) Focus Offset Adjust for DVD-RAM (Data Error pulse)



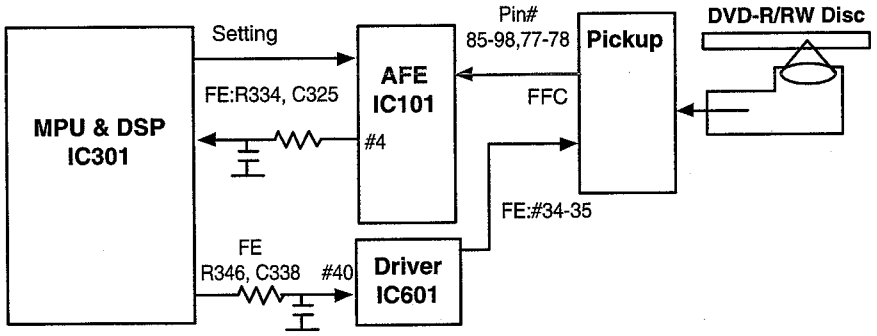
(14) Tilt Adjust for DVD-RAM



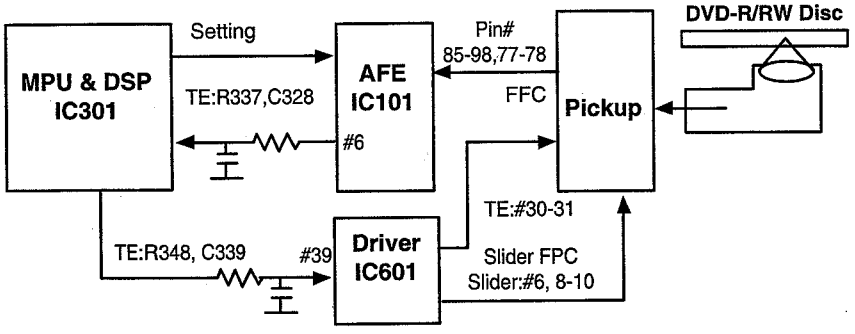
(15) Tilt Adjust for DVD-R/RW, DVD+R/RW, CD-R/RW



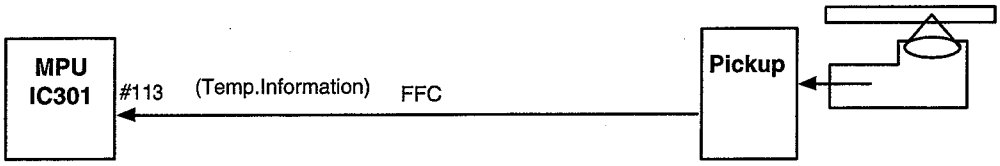
(16) Focus Deviation Adjust



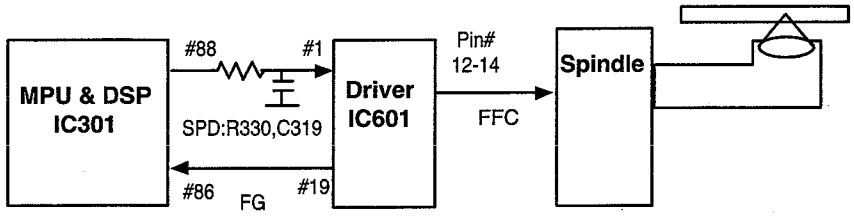
(17) Focus Offset Adjust for DVD-R/RW, DVD+R/RW, CD-R/RW



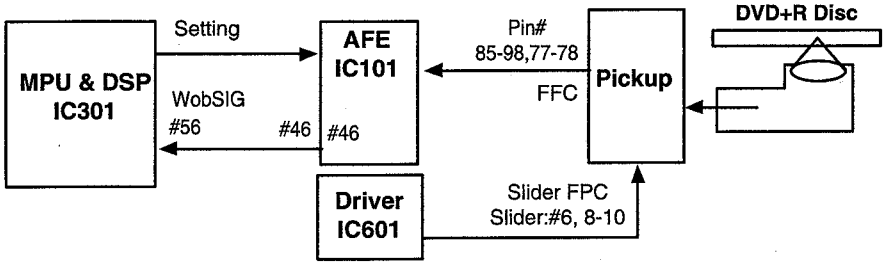
(18) Lens Sensitivity Adjust



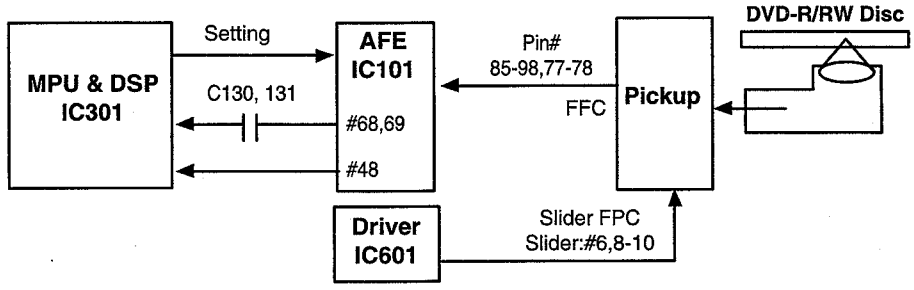
(19) Spindle Offset Adjust



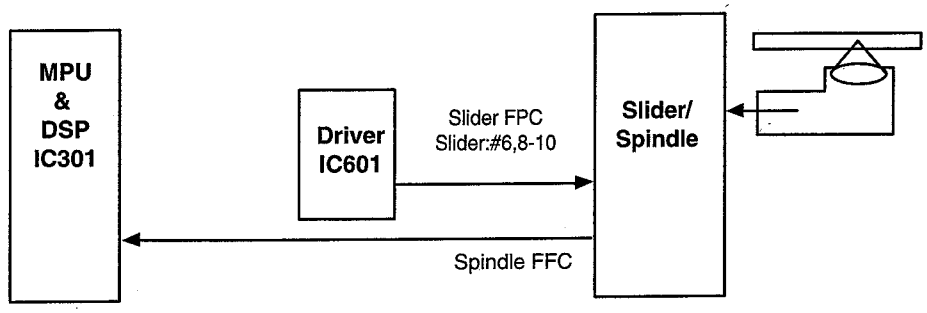
(20) ADIP BPF/Read Timing Adjust for DVD+R/RW



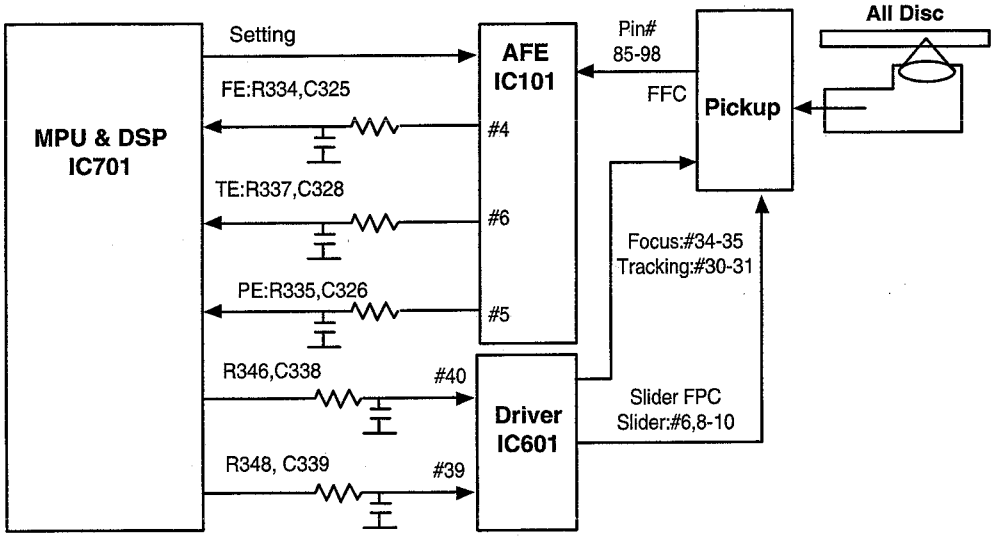
(21) Focus Offset Adjust for DVD-R/RW, DVD+R/RW(DID)



(22) RTZ TimeOut Fail



(23) Focus Servo/Tracking Servo Fail



Detail Error Code & Fail Analysis

1. Laser Power Initial Adjust

No.	Error Code **SSB Byte8,9**	Contents of fail	Fail Analysis	Block Diagram
1	28xx (Exchange low/high byte) Byte8: xxh Byte9: 28h	LP Adjust NG.	1) Check Pickup FFC Connection. 2) Check solder of IC101circumference. (pin#10, 14, 16, L150, L151) 3) Check solder of IC201. 4) Exchange Pickup(LDD, Front Monitor). 5) Exchange IC101(AFE). 6) Exchange IC301(MPU & DSP).	No.01
2	48xx	High Frequency Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup (LDD part). 3) Exchange IC301(DSP).	No.02
3	5Exx	NRZi Skew Adjust NG.	1) Check Pickup FFC Connection 2) Exchange Pickup (LDD part). 3) Exchange IC301(DSP).	No.02
4	4C0x to 4C4x	Data Slice Adjust NG.	1) Check solder of IC101circumference. (pin# 76, IC103, L150, L151) 2) Exchange IC101(AFE). 3) Exchange IC301(DSP).	No.03
5	4C5x to 4C7x	EQ Boost Adjust NG.	1) Check solder of IC101circumference. (pin# 76, IC103, L150, L151) 2) Exchange IC101(AFE). 3) Exchange IC301(DSP).	
6	4C80	RAW Slice Level Adjust NG.	1) Check solder of IC101circumference. (pin# 76, IC103, L150, L151) 2) Exchange IC101(AFE). 3) Exchange IC301(DSP).	
7	4CAx	EQ Auto Frequency Adjust NG.	1) Check solder of IC101circumference. (pin# 76, IC103, L150, L151) 2) Exchange IC101(AFE). 3) Exchange IC301(DSP).	

2. Adjusting Error during Disc Load Sequence (Lead in Error)

No.	Error Code **SSB Byte21,22**	Contents of fail	Fail Analysis	Block Diagram
1	42xx	Circuit Offset Adjust NG.	1) Check Pickup FFC Connection. 2) Check solder of IC101circumference . (pin#,4,5,6 pin#85-98, FE_Servo: R334, C325 TE_Servo: R337, C328 PE_Servo: R335, C326) 3) Exchange IC101(AFE). 4) Exchange Pickup. 5) Exchange IC301(DSP).	No.04
2	452x	Focus Amp Adjust NG. (DVD-DL Only)	1) Check DVD-Dual Disc. 2) Check Pickup FCC Connection. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, FE_Servo: R334, C325) 4) Check Slider FPC Connection. 5) Exchange IC101(AFE). 6) Exchange IC601(Driver). 7) Exchange IC301(DSP).	No.05
3	450x 451x 454x	Focus Amp Adjust NG. Total Amp Adjust NG.	1) Check Pickup FFC Connection. 2) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, FE_Servo: R334, C325 PE_Servo: R335, C326) 3) Exchange Pickup. 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.06
4	458x	Tracking Amp Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, TE_Servo: R337, C328) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.07
5	45Ax	Lens DAC Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, TE_Servo: R337, C328) 4) Check solder of IC301circumference. (R338,R339,C329,C330) 5) Exchange IC101. 6) Exchange IC301.	No.08
6	46xx	Lens Position Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, TE_Servo: R337, C328) 4) Check solder of IC301circumference. (R338,R339,C329,C330) 5) Exchange IC101. 6) Exchange IC301.	No.08

No.	Error Code **SSB Byte21,22**	Contents of fail	Fail Analysis	Block Diagram
7	47xx	Servo Loop Gain Adjust NG.	47XA: Disc Unmatch(Exchange Disc). 1) Check Pickup FFC Connection. 2) Exchange Pickup (Signal Noisy). 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, FE_Servo: R334, C325 TE_Servo: R337, C328) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.9
8	49xx	Unwritten Slice Level Adjust NG. (RAM Only)	4906: RAM Disc NG (Exchange Disc). 1) Check solder of IC101circumference. (pin#4,5,6 pin#85-98) 2) Exchange IC101(AFE). 3) Exchange IC301(MPU).	N0.10
9	4Axx	Focus Offset Adjust NG. (DVD-ROM,CD-R/RW)	4A08: Disc Unmatch(Exchange Disc). 1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Exchange IC301(DSP).	No.11
10	4A5x 4A6x	Focus Offset Adjust NG. (RAM Only for PID)	1) RAM Disc NG (Exchange RAM Disc) 2) Exchange Pickup 3) Exchange IC101(AFE) 4) Exchange IC301(DSP)	No.12
11	4A8x	Focus Offset Adjust NG. (RAM Only for Data)	4A88: RAM Disc NG (Exchange RAM Disc). 1) Exchange Pickup. 2) Exchange IC101(AFE).	No.13
12	4B0x	Tilt Adjust NG(RAM Only).	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#10,11 R340,C331,R341,C333) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.14
13	4B8x	Tilt Adjust NG(DVD-/+ R/RW).	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC601 circumference. 4) Exchange IC601. 5) Check solder of IC301 circumference. 6) Exchange IC301 7) Exchange Slider Motor.	No.15
14	4CCx	Data Slice Adjust NG. (RAM Only)	1) Exchange Pickup. 2) Exchange IC101(AFE). 3) Exchange IC301(DSP).	No.13
15	4Dxx	Focus Deviation Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC301circumference. 4) Exchange IC301(DSP).	No.16

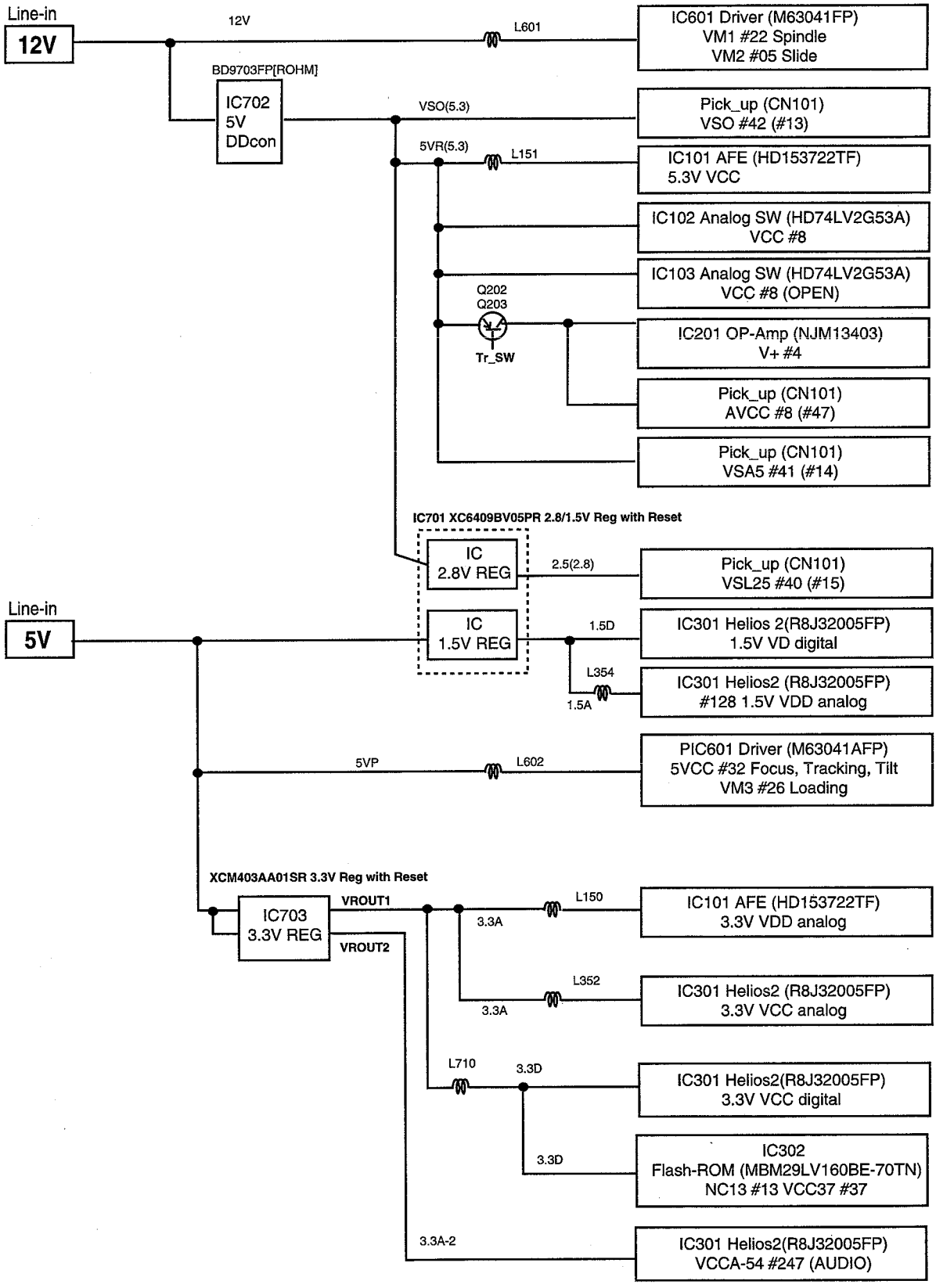
No.	Error Code **SSB Byte21,22**	Contents of fail	Fail Analysis	Block Diagram
16	182x 01xx	Home Position Adjust NG. (DVD-SL Only)	1) Check FFC Connection. 2) Check Slider FPC Connection. 3) Exchange Slider Motor. 4) Check solder of IC101circumference. 5) Exchange IC101(AFE).	No.22
17	52xx	Focus Offset Adjust NG. (DVD-R/RW, +R/RW)	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, TE_Servo: R337, C328) 4) Exchange IC101(AFE).	No.17
18	54xx	DPP Amp Adjust NG. (CD Disc Only)	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, TE_Servo: R337, C328) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.07
19	55xx	Lens Shift/ Tilt Adjust NG. (CD Disc Only)	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC601 circumference. 4) Exchange IC601. 5) Check solder of IC701 circumference. 6) Exchange IC301	No.15
20	56xx	Focus Level Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, PE_Servo: R335, C326) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.06
21	57xx	HFPE Amp/Gain Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. (pin#10,11 R340,C331,R341,C334) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.14
22	58xx	Lens Sensitivity Adjust NG.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC301circumference. 4) Exchange IC301(MPU).	No.18

No.	Error Code **SSB Byte21,22**	Contents of fail	Fail Analysis	Block Diagram
23	59xx	Spindle Offset Adjust NG.	1) Check Spindle FFC Connection. 2) Check solder of IC601circumference. (pin#12-14) 3) Exchange IC601(Driver). 4) Exchange Spindle Motor. 5) Check solder of IC301circumference. 6) Exchange IC301(DSP).	No.19
24	5Axx	ADIP read timing Adjust NG.	5A01: Check DVD+R Disc (Exchange Disc) . 1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Exchange IC101(AFE). 4) Exchange IC301(DSP).	No.20
25	5Cxx	Signal Amp Error.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC701circumference. (pin#4,5,6 pin#85-98, PE_Servo: R335, C326) 4) Exchange IC101(AFE). 5) Exchange IC301(DSP).	No.06
26	5Dxx	Focus Offset Adjust NG. (DVD-R/RW,+R/RW in Data)	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC101circumference. 4) Exchange IC101. 5) Check solder of IC701circumference. 6) Exchange IC301. 7) Exchange Slider Moter.	No.21

3. Loading Sequence Error (Lead in Error)

No.	Error Code **SSB Byte21,22**	Contents of fail	Fail Analysis	Block Diagram
1	2503,2504	RTZ Timeout(Sled Timeout).	1) Check Slider FPC Connection. 2) Check solder of IC601 circumference . (pin#2-3, 6, 8-10) 3) Exchange IC601. 4) Exchange Slider Motor.	No.22
2	2020,2021	Focus Fail.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC601circumference. 4) Exchange IC601(Driver) 5) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, FE_Servo: R334, C325) 6) Exchange IC101.	No.23
3	2101,2102	Tracking Fail.	1) Check Pickup FFC Connection. 2) Exchange Pickup. 3) Check solder of IC601circumference. 4) Exchange IC601(Driver). 5) Check solder of IC101circumference. (pin#4,5,6 pin#85-98, TE_Servo: R337, C328). 6) Exchange IC101.	No.23
4	2000~2010	Spindle Fail.	1) Check Spindle FFC Connection. 2) Check solder of IC601circumference. (pin#12-14) 3) Exchange IC601(Driver). 4) Exchange Spindle Motor. 5) Check solder of IC301circumference. 6) Exchange IC301(DSP).	No.19

Power Supply System Diagram



PCB Poor Analysis - Check list

No	Circuit/IC	Signal	Signal/Level	mesurement-point (IC-pin or Device)
1	Power supply	Line-12V	12V	CN108-41
2		Line-5V	5V	CN108-44
3	(IC701)	reg-5.3V	5.3V	R711
4	(IC702)	reg-3.3V	3.3V	2,5
5	(IC703)	reg-1.5V	1.5V	2
6		reg-2.8V	2.8V	5
7	Flash-ROM	VDD : 3.3V	3.3V	37
8	(IC302)	CS	Active-Low	26
9		XRD	read-CK	28
10	DSP	VDD : 1.5V	1.5V	32, 53,128, 213, 173, 188
11	(IC301)	VCC(D) : 3.3V	3.3V	3, 10, 18, 23, 31, 39, 50, 62, 78, 91, 159, 176, 191, 222,
				244, 256
12		VCC(A) : 3.3V	3.3V	98, 99, 111, 122, 129, 138, 153
13		Clock-34MHz	33.8688MHz	254, 255
14		MRSTB	(3.3V)High	5
15	AFE	VCC : 5.3V	5.3V	17, 75
	(IC101)	VDD:3.3V	3.3V	12, 27, 57, 70, 79, 89
16	OP-amp	VCC : 5.3V	5.3V	4
17	(IC201)	VC165	1.65V	8
18	7ch-DRV	5VCC : 5V	5V	32
19	(IC601)	VM3 : 5V	5V	26
20		VM1, 2 : 12V	12V	5, 22
21		REF : 1.65V	1.65V	42
22	Pick-up	AVCC : 5.3V	5.3V	8
23		VC21	2.1V	13
24		VC165	1.65V	28
25		VC25	2.8V	32
26		VSL25 : 2.8V	2.8V	40
27		VSA5 : 5.3V	5.3V	41
28		VSO : 5.3V	5.3V	42

* When there are twe or more power supply pins of LSI, it checks by one ramdom pin first.

HW Self- Diagnostic function

1. Self-Diagnostic Function by LED Blink.

- **Basic operation**: MPU is included in DSP, MPU accesses each peripheral (inside, exterior) device, and discover a defect by the ability of a read/write of data to be performed correctly. Since MPU operates by the program with a built-in Flash-ROM, when abnormalities are in MPU, Flash-ROM, and these Data-Bus & control signals, this self-diagnostic function cannot be used. In such a case, the case where LED does not light up at all at the time of a power supply injection is almost the case.

- **MPU**: In DSP Flash-ROM (16Mb) is connected to the exterior Bus of MPU. Even if the MPU-Bus terminal of Flash-ROM short-circuits, it becomes impossible for MPU to read the right program data from Flash-ROM, and stops for this reason, turning on LED at all. On the other hand, the own poor device of DSP, and the open state of IC-pin, when [poor] not influencing Bas of MPU, it can detect correctly and becomes blink of LED according to those defects.

- **DSP**: DSP has ATAPI-IF, LDD-serial-IF, AFE-serial-IF, and an AFE control signal as Digital-IF. As Analog-IF, it has the slice circuit of RF signal from AFE, PLL, the objects ADC and DAC for SERVO, and ADC for ADIP detection. Among these, own poor Digital of DSP, and AFE-serial-IF can detect by this self-diagnostic function.

- **AFE**: Poor detection of AFE is restricted to detection of a limitation-item. Since the greater part of the function is analog signal processing, AFE serves as a register in AFE, and a check, which accepts it, serial IF in the logical digital examination from MPU. In addition, serial-IF for AFE control is performed via DSP. This is writing in the Write command and setting data, and is automatically transmitted to the predetermined register of DSP. Conversely, when it leads the register information on AFE, the read command can be written in the predetermined register of DSP, and the value of an AFE register can be read by reading the read register of DSP after that. Therefore, serial [between the poor register of AFE, and AFE and DSP], when there is LED blink with poor AFE — the defect of IF or the defect of the register for AFE of DSP is considered.

- Refer to the contrast table of the number of times of blink of LED, and a poor part.

- The self-diagnostic function by this LED blink is carried out in the state of a set without a PCB independent or loading Disc.

2. LED does not blink at all at the time of a power supply injection. Eject-SW does not react.

(1) Is it normal to the exterior Bus (Data-Bus, Address-Bus, control signal system) of MPU?

Viewing — check: -- a short circuit, opening, etc.

- **The device connected to the exterior Bus of MPU in DSP, and its signal list**

Peripheral device [Bus/Signal]	Flash -ROM (IC302)
Address	A1~A20
Data	D0~D15
CS*	CS0B
WCK	WR
RCK	RD

=> It repairs, when abnormalities are discovered.

(2) Does the power supply circuit operate normally?

When the abnormalities in external input 12V, 5V, regulator 5V, regulator 3.3V, and regulator 1.5V => are discovered, an external power supply, a power supply cable, and Regulator IC are exchanged. Since a problem is in a load side when not improving, even if it carries out the => above mentioned exchange, a power-supply system figure is made reference, and poor portions, such as a short circuit of a power supply part, are found out and repaired.

(3) Is the clock of MPU in DSP oscillated correctly?

Checked the ceramic oscillation element's X301 both-ends and DSP(254)(255) 33.87MHz oscillating. When 3.3V power supply is correctly supplied to =>DSP and the clock is not oscillating correctly, it is the defect of MPU, or an oscillation element defect, and part exchange is performed in order of DSP and X301.

(4) The defect of Flash-ROM

Although the clock of DSP is oscillating correctly and the power supply circuit is also outputting normal voltage, when LED does not blink at all at the time of a power supply injection and Eject-SW does not react, either, poor Flash-ROM is the most doubtful.

=> Flash-ROM (IC302) are exchanged.

Note: Before Flash-ROM exchange, the CS signals of the external device of MPU in DSP connection, an Address signal, and a Data signal are observed on a waveform level, and since the but most amount of work and the special knowledge which can raise the discovery accuracy of a poor part are necessities, recommendation is impossible.

(5) Even if it performs the above-mentioned repair, when not improving, the disconnection and the short circuit, which cannot be discovered, can be considered in viewing of PCB. Moreover, partial breakage (although a clock is oscillated, somewhere in insides do not operate.) of DSP can be considered. => above, the possibility that a PCB pattern is faulty is high, and judges repair to be difficult.

3. Motor, Abnormalities in Actuator System

The drive circuit of a motor & actuator consists of the three ICs IC601 (M63041AFP). The work of each IC is as follows.

(1) IC601(M63041AFP) : 7ch driver

Spindle motor driver: 180° audio drive Type, an analog input, a PWM drive, a Vm=12V.
Stepping motor driver X2: analog input, a PWM drive (differential), a Vm=12V
Loading motor driver: Input/Output PWM drive, Vm=5V.
Focus actuator driver: analog input / output (differential), a Vm=5V
Tracking actuator driver: analog input / output (differential), Vm=5V
Tilt actuator driver : analog input/output (differential), Vm=5V.

A motor & actuator and its correspondence pin

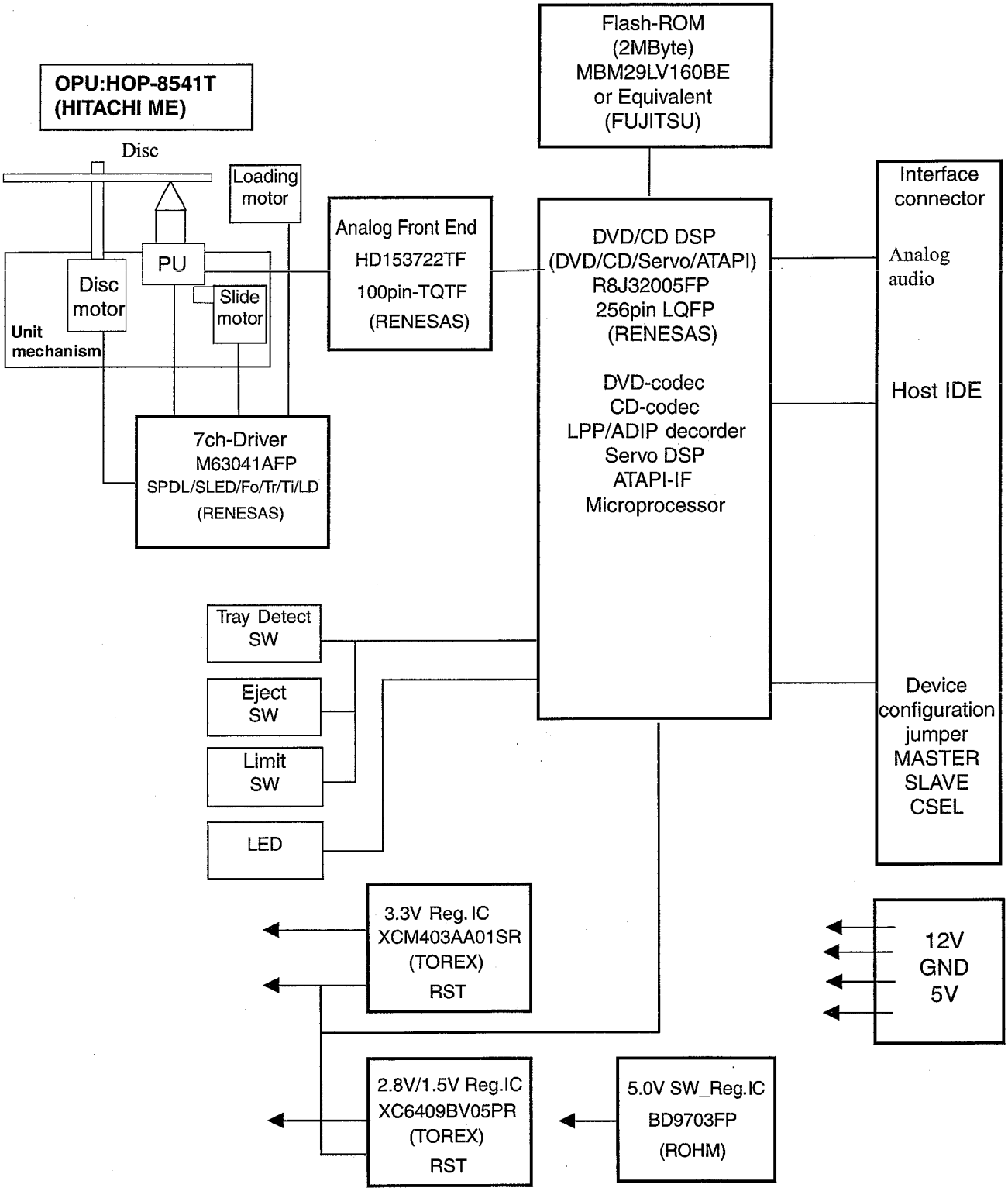
Signal/CH	SPDL-MT	STEP-MT	Load-MT	Focus-ACT	Track-ACT	Tilt-ACT
Input	(1)SPIN	(2)SL1IN (3)SL2IN	(41)LOIN	(40)FOIN	(39)TOIN	(38)TLIN
Reference			(42)REF 1.65V			
Output	(12)U (13)V (14)W	(6)SL2+ (8)SL2- (9)SL1+ (10)SL1-	(27)LO+ (28)LO-	(34)FO+ (35)FO-	(31)TO+ (30)TO-	(36)TL+ (37)TL-

A control mode setup by the control terminal

EN1(20)	EN2(21)	SPDL	SLED	Load	Focus/Track/Tilt
Low	Low	off	off	off	off
Low	High	off	on	on	off
High	Low	on	on	off	on
High	High	on	on	off	on

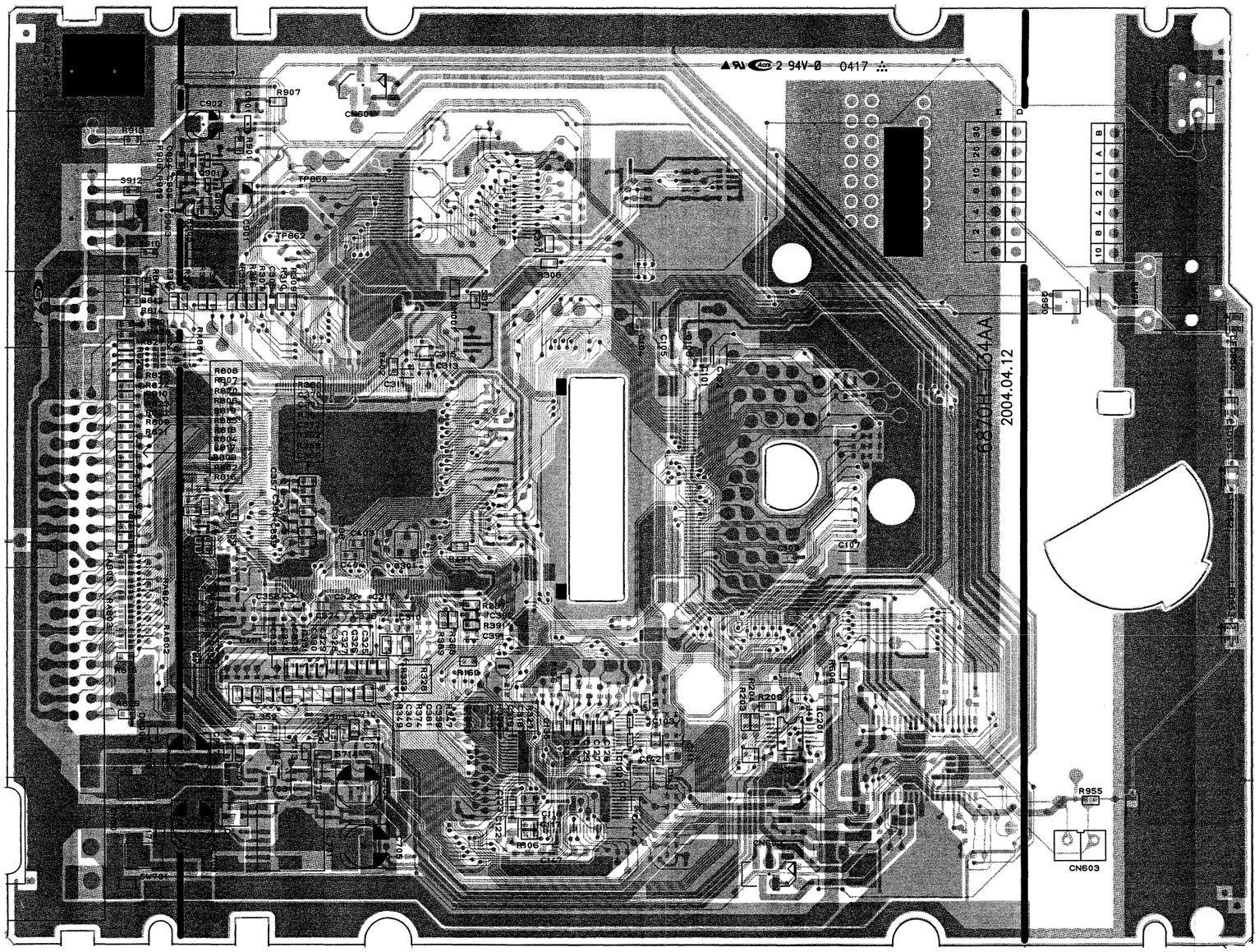
MEMO

BLOCK DIAGRAM



PRINTED CIRCUIT BOARD DIAGRAM

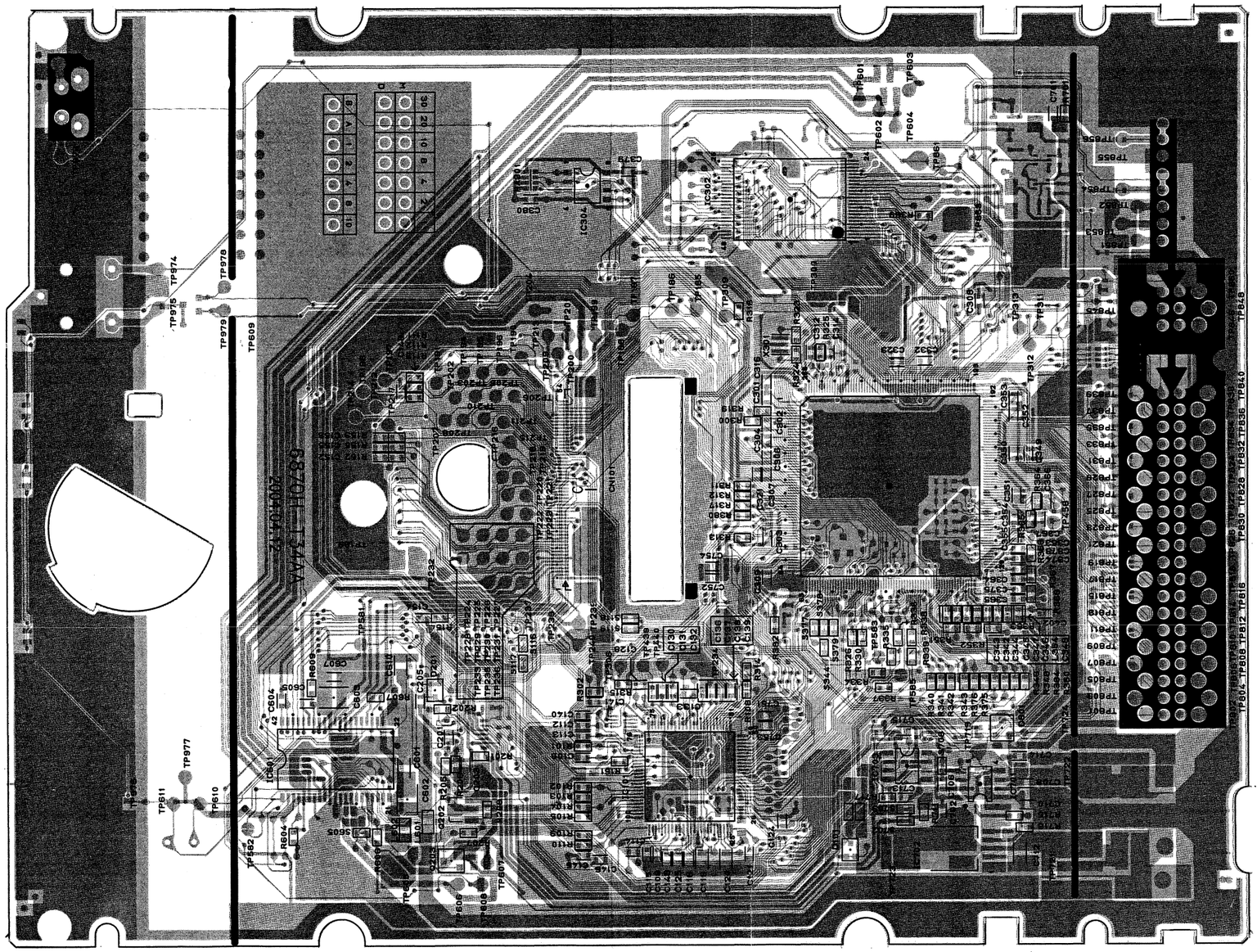
- **Main Board**



(Top Side)

NOTES :
Top Side : Parts of Top Side seen in Top Side are marked.
Bottom Side : Parts of Bottom side seen in Bottom side are marked.

■ The pattern as you face it.
■ The opposite pattern.



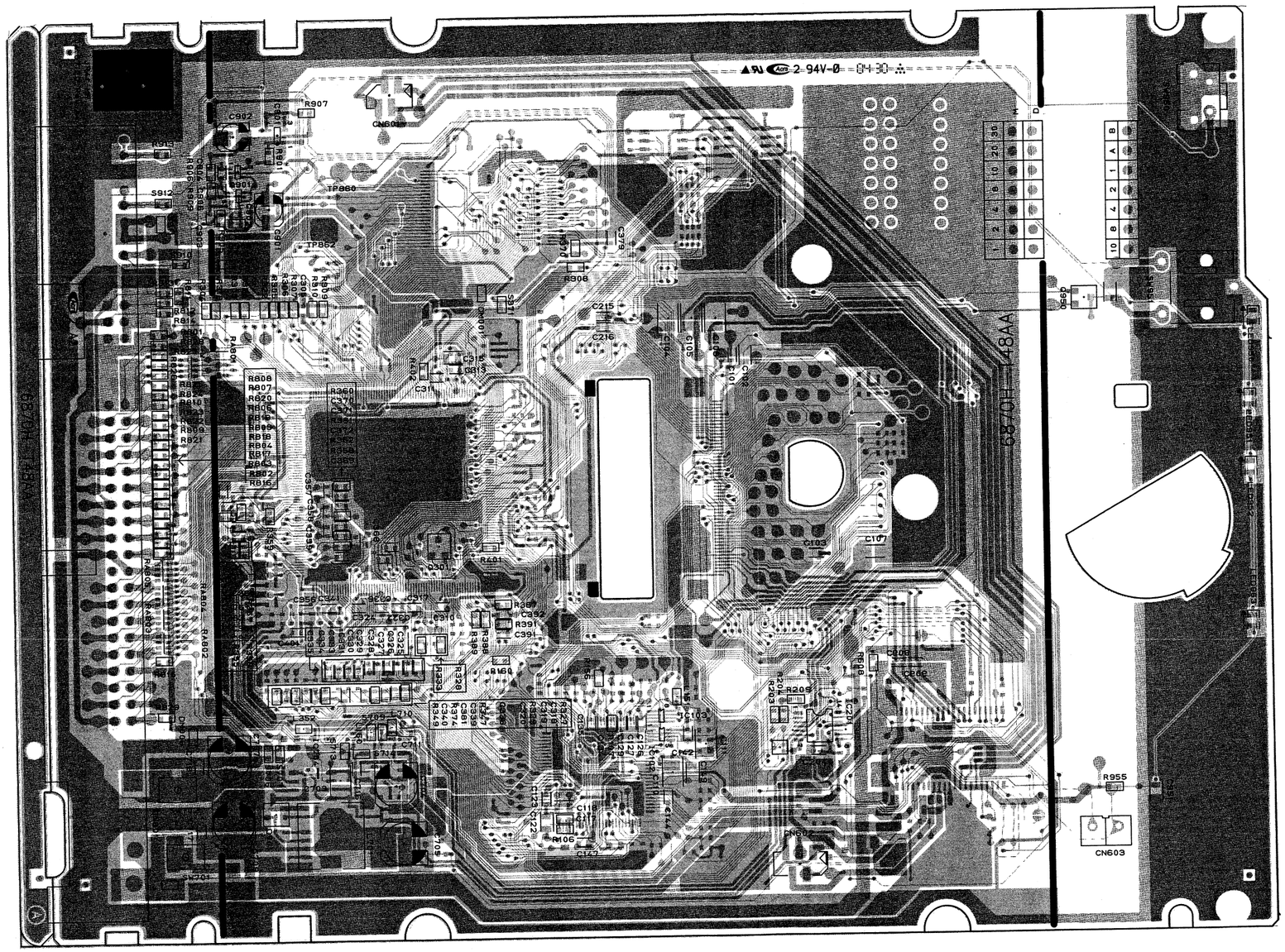
(Bottom Side)

■ The pattern as you face it.
■ The opposite pattern.

NOTES :
Top Side : Parts of Top Side seen in Top Side are marked.
Bottom Side : Parts of Bottom side seen in Bottom side are marked.

PRINTED CIRCUIT BOARD DIAGRAM

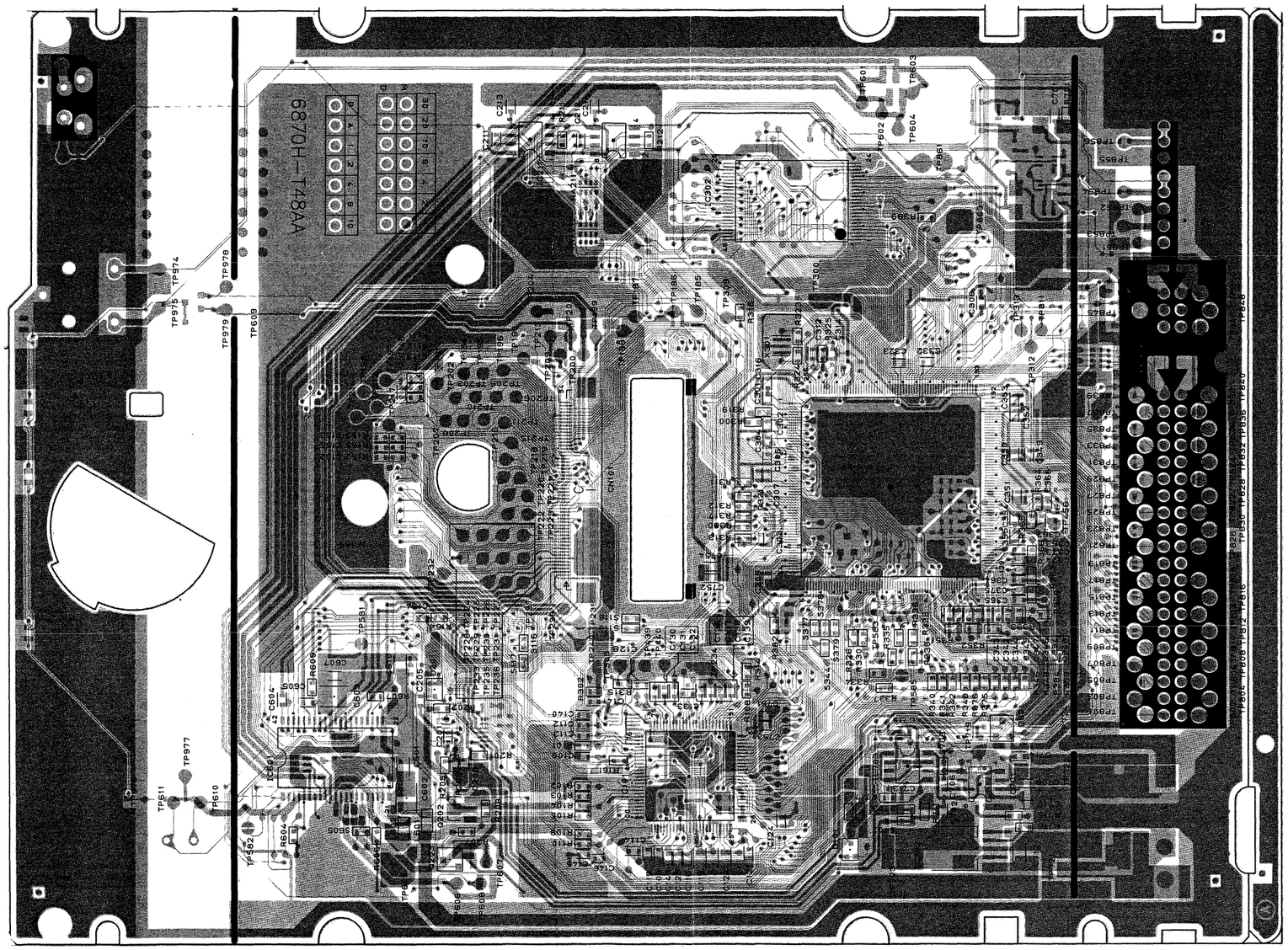
- **Main Board**



(Top Side)

NOTES :
Top Side : Parts of Top Side seen in Top Side are marked.
Bottom Side : Parts of Bottom side seen in Bottom side are marked.

■ The pattern as you face it.
■ The opposite pattern.



(Bottom Side)

■ The pattern as you face it.
■ The opposite pattern.

NOTES :
Top Side : Parts of Top Side seen in Top Side are marked.
Bottom Side : Parts of Bottom side seen in Bottom side are marked.

ELECTRICAL REPLACEMENT PARTS LIST

• MODEL : GSA-5120D

RUN DATE : 04.11.26

CAUTION: The * marks in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. Before replacing any of these components, read carefully the SAFETY PRECAUTIONS and SERVICING PRECAUTIONS in the manual. Do not degrade the safety of the unit through improper servicing.

Tolerance

Symbol	C	J	K	M	N	Z	P	A
%	±2	±5	±10	±20	±30	+80 −20	+100 −10	+100 −10

CC, CJ, CK: Capacitor, Ceramic
CE: Capacitor, Electrolytic
CQ: Capacitor, Polyester

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
			CAPACITOR	
		C101	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C102	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C103	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C104	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C105	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C106	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C107	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C108	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C109	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C110	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C111	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C112	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C113	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C114	0CH1472K562	4700PF 50V 10% X7R(X) 1608 R/T
		C115	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C116	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C117	0CH1822K562	8200PF 50V 10% X7R(X) 1608 R/T
		C118	0CK335NCG1A	3.3UF 2125 6.3V 10%,-10% B(Y5)
		C119	0CK124DH56A	0.12UF 2012 25V 10% R/TP X7R
		C120	0CK124DH56A	0.12UF 2012 25V 10% R/TP X7R
		C121	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C122	0CH1154K516	150000PF 50V 10% B(5YP) 2012 R
		C123	0CH1153K562	0.015UF 50V 10% X7R(X) 1608 R/
		C124	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C125	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C126	0CK104CF56A	0.1UF 1608 16V 10% R/TP X7R
		C127	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C128	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C129	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C130	0CH1152K562	1500PF 50V 10% X7R(X) 1608 R/T
		C131	0CH1152K562	1500PF 50V 10% X7R(X) 1608 R/T
		C132	0CH1472K562	4700PF 50V 10% X7R(X) 1608 R/T
		C133	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C134	0CK334CCG1A	0.33UF 1608 6.3V 10%,-10% B(Y)
		C135	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C136	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C137	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C138	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C139	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C140	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C141	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C143	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C144	0CH4221K412	220PF 50V 5% NP0 1608 R/TP

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		C145	0CH4221K412	220PF 50V 5% NP0 1608 R/TP
		C147	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C152	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C153	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C154	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C155	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C203	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C204	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C205	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C301	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C302	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C303	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C304	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C305	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C306	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C307	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C308	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C309	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C310	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C311	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C312	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C313	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C314	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C315	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C316	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C317	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C318	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C319	0CH1152K562	1500PF 50V 10% X7R(X) 1608 R/T
		C320	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C321	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C322	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C323	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C324	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C325	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C326	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C327	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C328	0CH4471K412	470PF 50V J NP0 1508 R/TP
		C329	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C330	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C331	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C332	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C333	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C334	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C335	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C336	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		C338	0CH4680K412	68PF 50V J NP0 1608 R/TP
		C339	0CH4470K412	47PF 50V 5% NP0 1608 R/TP
		C340	0CH4820K412	82PF 50V 5% NP0 1608 R/TP
		C341	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C342	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C343	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C344	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C345	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C346	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C347	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C348	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C349	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C350	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C351	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C352	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C353	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C354	0CK225CCG7A	2.2UF 1608 6.3V 10%,-10% X5R R
		C355	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C356	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C357	0CK224CCG1A	0.22UF 1608 6.3V 10%,-10% B(Y)
		C358	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C359	0CH1153K562	0.015UF 50V 10% X7R(X) 1608 R/
		C360	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C361	0CH4392K412	3900PF 50V 5% NP0 1608 R/TP
		C362	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C363	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C364	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C365	0CK224CCG1A	0.22UF 1608 6.3V 10%,-10% B(Y)
		C366	0CH4221K412	220PF 50V 5% NP0 1608 R/TP
		C367	0CH4471K412	470PF 50V J NP0 1508 R/TP
		C368	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C369	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C370	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C371	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C372	0CH4470K412	47PF 50V 5% NP0 1608 R/TP
		C373	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C374	0CH1122K512	1200PF 50V 10% B(5YP) 1608 R/T
		C375	0CH4471K412	470PF 50V J NP0 1508 R/TP
		C376	0CH4221K412	220PF 50V 5% NP0 1608 R/TP
		C377	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C379	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C381	0CH4820K412	82PF 50V 5% NP0 1608 R/TP
		C391	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C401	0CH4080K412	8PF 50V 5% NP0 1608 R/TP
		C402	0CH4080K412	8PF 50V 5% NP0 1608 R/TP
		C403	0CH4080K412	8PF 50V 5% NP0 1608 R/TP
		C404	0CH4080K412	8PF 50V 5% NP0 1608 R/TP
		C601	0CK105DF56A	1UF 2012 16V 10% R/TP X7R
		C602	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C603	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C604	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C607	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C610	0CK105DF56A	1UF 2012 16V 10% R/TP X7R
		C702	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C703	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
	OR	C704	0CH8107F621	100UF 16V 20% - R/TP
		C704	DCH8107F621	100UF 16V M 6666 R/TP
	OR	C705	0CH8107F621	100UF 16V 20% - R/TP
		C705	DCH8107F621	100UF 16V M 6666 R/TP
		C706	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
	OR	C707	0CH8107F621	100UF 16V 20% - R/TP
		C707	DCH8107F621	100UF 16V M 6666 R/TP

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		C708	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
	OR	C709	0CH8107F621	100UF 16V 20% - R/TP
		C709	DCH8107F621	100UF 16V M 6666 R/TP
		C711	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C712	0CH1105F946	1UF 16V 80%,-20% Y5V(F) 2012 R
		C713	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C714	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C715	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C716	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C717	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C718	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C751	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C752	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C753	0CH4100K412	10PF 50V 5% NP0 1608 R/TP
		C754	0CH4100K412	10PF 50V 5% NP0 1608 R/TP
		C901	0CH8226C621	22UF 6.3V 20% - R/TP
	OR	C901	DCH8226C621	22UF MV 6.3V 20% SMD R/TP(SMD)
		C902	0CH8226C621	22UF 6.3V 20% - R/TP
	OR	C902	DCH8226C621	22UF MV 6.3V 20% SMD R/TP(SMD)
		C903	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C904	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C951	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C952	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
FILTER				
		L150	6200J000030	MMZ1608Y102C TDK R/TP
		L151	6200J000030	MMZ1608Y102C TDK R/TP
		L352	6200JB8010M	HH-1M1608-121JT CERATECH R/TP
		L354	6200JB8010M	HH-1M1608-121JT CERATECH R/TP
		L601	6200JB8008E	HH-1M2012-221JTA CERATECH R/TP
		L602	6200JB8008E	HH-1M2012-221JTA CERATECH R/TP
		L710	6200JB8010M	HH-1M1608-121JT CERATECH R/TP
IC				
		IC101	0ILNRHI021A	HD153722TF HITACHI 100PIN/LQFP
		IC103	0ILNRHI016A	HD74LV2G53AUSE HITACHI SSOP-8P
		IC201	0ILNRJR016A	NJM13403 JRC 14PIN/SSOP R/TP O
		IC301	0ILNRHI020A	R8J32005FP HITACHI 256PIN/LQFP
	OR	IC302	0IMMRFU012C	MBM29LV160BE-70TN-KE1 FUJITSU
		IC302	0IMMRFU012D	MBM29LV160BE-70TN-KE1 FUJITSU
	OR	IC302	0IMMRMR019C	MX29LV160ABTC-70G(JR3 F/W 1S)
	OR	IC302	0IMMRMR019D	MX29LV160ABTC-70G (PB-FREE &)
	OR	IC302	0IMMRMR019E	MX29LV160BBTC-70G MACRONIX 48P
	OR	IC302	0IMMRSW018A	SST39VF1601-70-4C-EK SST 48PIN
		IC601	0ILNRMI010B	M63041AFP MITSUBISHI SSOP R/TP
		IC701	0IPMGTR036A	XC6409BV05SR TOREX SEMICONDUCT
		IC702	0ILNRRH032A	BD9703FP-E2 ROHM TO252-5 R/TP
		IC703	0IPMGTR043A	XCM403AA01SR TOREX SEMICONDUCT
COIL				
		L701	0LCTD00008A	SLF10145T-221MR65 TDK R/TP
LED				
		LED953	0DL210009GA	ROHM SML-210FC R/TP GREEN 4
CIRCUIT BOARD ASSEMBLY				
		PBS00	6871H-3601A	USB2.0/1394 BRIDGE BOARD WITH
		PBM00	6871H-T34LP	JRP1(JR4) MAIN PWB ASSY

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TRANSISTOR				
	OR	Q201	0TR461739AA	2SC4617 TP ROHM EMT3 - EMT3 3K
		Q201	0TRKE80053A	KTC4075E KEC R/TP ESM 50V 0.15
	OR	Q202	0TR142409AA	2SB1424 TP ROHM KOREA NON MPT3
		Q202	0TRAU80018A	STB1188Y AUK KOREA R/TP SOT-89
	OR	Q203	0TR107009AA	CHIP KRC107S-T1(NG)10-47 TP KE
		Q203	0TRAU80009A	AUK KOREA SRC1207S R/TP SMT3 5
	OR	Q301	0TR107009AA	CHIP KRC107S-T1(NG)10-47 TP KE
		Q301	0TRAU80009A	AUK KOREA SRC1207S R/TP SMT3 5
		Q901	0TRAU80020A	SUR482H AUK KOREA R/TP SOT-353
	OR	Q901	0TRRH80017A	ROHM KOREA UMC5N R/TP UMT .V .
		Q902	0TRAU80019A	SUR522H AUK KOREA R/TP SOT-353
	OR	Q902	0TRRH80009A	ROHM KOREA UMG4N R/TP UMT 50V
	OR	Q950	0TR107009AA	CHIP KRC107S-T1(NG)10-47 TP KE
		Q950	0TRAU80009A	AUK KOREA SRC1207S R/TP SMT3 5
RESISTOR				
		R102	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R103	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R104	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R105	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R106	0RH6803C622	680K OHM 1 / 16 W 1608 5.00% D
		R107	0RH1202C422	12K OHM 1 / 16 W 1608 1.00% D
		R108	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R109	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R110	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R113	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R152	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R153	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R154	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R155	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R156	0RH2203C622	220K OHM 1 / 16 W 1608 5.00% D
		R160	0RH1000C622	100 OHM 1 / 16 W 1608 5.00% D
		R161	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R201	0RH0682C622	68 OHM 1 / 16 W 1608 5.00% D
		R202	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R203	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R205	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R206	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R207	0RH8200C622	820 OHM 1 / 16 W 1608 5.00% D
		R208	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R209	0RH3301C622	3.3K OHM 1 / 16 W 1608 5.00% D
		R300	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R302	0RH8200C622	820 OHM 1 / 16 W 1608 5.00% D
		R303	0RH4701C622	4.7K OHM 1 / 16 W 1608 5.00% D
		R304	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R305	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R306	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R307	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R308	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R309	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R310	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R311	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R312	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R313	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R314	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R315	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R316	0RH8201C622	8.2K OHM 1 / 16 W 1608 5.00% D
		R318	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R319	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R320	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		R322	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R323	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R325	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R326	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R327	0RH3902C622	39K OHM 1 / 16 W 1608 5.00% D
		R328	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R329	0RH1803C622	180K OHM 1 / 16 W 1608 5.00% D
		R330	0RH2203C622	220K OHM 1 / 16 W 1608 5.00% D
		R333	0RH1502C622	15K OHM 1 / 16 W 1608 5.00% D
		R334	0RH3301C622	3.3K OHM 1 / 16 W 1608 5.00% D
		R335	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R336	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R337	0RH3301C622	3.3K OHM 1 / 16 W 1608 5.00% D
		R338	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R339	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R340	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R341	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R342	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R343	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R346	0RH2202C622	22K OHM 1 / 16 W 1608 5.00% D
		R347	0RH3902C622	39K OHM 1 / 16 W 1608 5.00% D
		R348	0RH8202C622	82K OHM 1 / 16 W 1608 5.00% D
		R349	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R350	0RH8202C622	82K OHM 1 / 16 W 1608 5.00% D
		R351	0RH2700C622	270 OHM 1 / 16 W 1608 5.00% D
		R352	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R353	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R355	0RH3303C622	330K OHM 1 / 16 W 1608 5.00% D
		R356	0RH3303C622	330K OHM 1 / 16 W 1608 5.00% D
		R357	0RH2702C622	27K OHM 1 / 16 W 1608 5.00% D
		R358	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R359	0RH4701C622	4.7K OHM 1 / 16 W 1608 5.00% D
		R360	0RH1501C622	1.5K OHM 1 / 16 W 1608 5.00% D
		R361	0RH1501C622	1.5K OHM 1 / 16 W 1608 5.00% D
		R362	0RH1501C622	1.5K OHM 1 / 16 W 1608 5.00% D
		R364	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R365	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R366	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R367	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R368	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R369	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R370	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R374	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R375	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R376	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R380	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R382	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R384	0RH8202C622	82K OHM 1 / 16 W 1608 5.00% D
		R387	0RH3901C622	3.9K OHM 1 / 16 W 1608 5.00% D
		R389	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R391	0RH3300C622	330 OHM 1 / 16 W 1608 5.00% D
		R401	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R402	0RH0102C622	10 OHM 1 / 16 W 1608 5.00% D
		R604	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R606	0RH1502C622	15K OHM 1 / 16 W 1608 5.00% D
		R609	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R701	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R711	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R716	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R717	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R801	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R802	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		R803	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R804	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R805	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R806	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R807	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R808	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R809	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R810	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R812	0RH0102C622	10 OHM 1 / 16 W 1608 5.00% D
		R814	0RH0102C622	10 OHM 1 / 16 W 1608 5.00% D
		R815	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R816	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R817	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R818	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R819	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R820	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R821	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R822	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R823	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R824	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R825	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R826	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R827	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R828	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R829	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R901	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R905	0RH3300C622	330 OHM 1 / 16 W 1608 5.00% D
		R906	0RH3300C622	330 OHM 1 / 16 W 1608 5.00% D
		R907	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R908	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R909	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R955	0RH1500C622	150 OHM 1 / 16 W 1608 5.00% D
		RA801	0RR0822Q62A	82 OHM 1/16 W 3216 5.00% R/TP
		RA802	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
		RA803	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
		RA804	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
		RA805	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
SWITCH				
		SW950	558-026I	TACT JTP-1236A JEIL
		SW951	6600HXF102A	MPU20160MLB0 MIC NON DC5V 0.7M

ELECTRICAL REPLACEMENT PARTS LIST

• MODEL : GSA-5160D

RUN DATE : 04.11.26

CAUTION: The * marks in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. Before replacing any of these components, read carefully the SAFETY PRECAUTIONS and SERVICING PRECAUTIONS in the manual. Do not degrade the safety of the unit through improper servicing.

Tolerance

Symbol	C	J	K	M	N	Z	P	A
%	±2	±5	±10	±20	±30	+80 −20	+100 −10	+100 −10

CC, CJ, CK: Capacitor, Ceramic
CE: Capacitor, Electrolytic
CQ: Capacitor, Polyester

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
			CAPACITOR	
		C101	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C102	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C103	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C104	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C105	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C106	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C107	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C108	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C109	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C110	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C111	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C112	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C113	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C114	0CH1472K562	4700PF 50V 10% X7R(X) 1608 R/T
		C115	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C116	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C117	0CH1822K562	8200PF 50V 10% X7R(X) 1608 R/T
		C118	0CK335NCG1A	3.3UF 2125 6.3V 10%,-10% B(Y5)
		C119	0CK124DH56A	0.12UF 2012 25V 10% R/TP X7R
		C120	0CK124DH56A	0.12UF 2012 25V 10% R/TP X7R
		C121	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C122	0CH1154K516	150000PF 50V 10% B(5YP) 2012 R
		C123	0CH1153K562	0.015UF 50V 10% X7R(X) 1608 R/
		C124	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C125	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C126	0CK104CF56A	0.1UF 1608 16V 10% R/TP X7R
		C127	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C128	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C129	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C130	0CH1152K562	1500PF 50V 10% X7R(X) 1608 R/T
		C131	0CH1152K562	1500PF 50V 10% X7R(X) 1608 R/T
		C132	0CH1472K562	4700PF 50V 10% X7R(X) 1608 R/T
		C133	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C134	0CK334CCG1A	0.33UF 1608 6.3V 10%,-10% B(Y)
		C135	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C136	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C137	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C138	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C139	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C140	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C141	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C143	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C144	0CH4221K412	220PF 50V 5% NP0 1608 R/TP

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		C145	0CH4221K412	220PF 50V 5% NP0 1608 R/TP
		C147	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C152	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C153	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C154	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C155	0CH4331K412	330PF 50V 5% NP0 1608 R/TP
		C203	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C204	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C205	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C213	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C214	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C215	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C216	0CH4100K412	10PF 50V 5% NP0 1608 R/TP
		C301	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C302	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C303	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C304	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C305	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C306	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C307	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C308	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C309	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C310	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C311	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C312	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C313	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C314	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C315	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C316	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C317	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C318	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C319	0CH1152K562	1500PF 50V 10% X7R(X) 1608 R/T
		C320	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C321	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C322	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C323	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C324	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C325	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C326	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C327	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C328	0CH4471K412	470PF 50V J NP0 1508 R/TP
		C329	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C330	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C331	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C332	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		C333	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C334	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C335	0CH4561K412	560PF 50V 5% NP0 1608 R/TP
		C336	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C338	0CH4680K412	68PF 50V J NP0 1608 R/TP
		C339	0CH4470K412	47PF 50V 5% NP0 1608 R/TP
		C340	0CH4820K412	82PF 50V 5% NP0 1608 R/TP
		C341	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C342	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C343	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C344	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C345	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C346	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C347	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C348	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C349	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C350	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C351	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C352	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C353	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C354	0CK225CCG7A	2.2UF 1608 6.3V 10%,-10% X5R R
		C355	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C356	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C357	0CK224CCG1A	0.22UF 1608 6.3V 10%,-10% B(Y)
		C358	0CH1683F562	68000PF 16V 10% X7R(X) 1608 R/
		C359	0CH1153K562	0.015UF 50V 10% X7R(X) 1608 R/
		C360	0CH1103K562	0.01UF 50V 10% X7R(X) 1608 R/T
		C361	0CH4392K412	3900PF 50V 5% NP0 1608 R/TP
		C362	0CH1222K512	2200PF 50V 10% B(5YP) 1608 R/T
		C363	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C364	0CK474CC5CA	0.47UF 1608 6.3V 10% R/TP JB
		C365	0CK224CCG1A	0.22UF 1608 6.3V 10%,-10% B(Y)
		C366	0CH4221K412	220PF 50V 5% NP0 1608 R/TP
		C367	0CH4471K412	470PF 50V J NP0 1508 R/TP
		C368	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C369	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C370	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C371	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C372	0CH4470K412	47PF 50V 5% NP0 1608 R/TP
		C373	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C374	0CH1122K512	1200PF 50V 10% B(5YP) 1608 R/T
		C375	0CH4471K412	470PF 50V J NP0 1508 R/TP
		C376	0CH4221K412	220PF 50V 5% NP0 1608 R/TP
		C377	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C379	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C381	0CH4820K412	82PF 50V 5% NP0 1608 R/TP
		C391	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C401	0CH4080K412	8PF 50V 5% NP0 1608 R/TP
		C402	0CH4080K412	8PF 50V 5% NP0 1608 R/TP
		C601	0CK105DF56A	1UF 2012 16V 10% R/TP X7R
		C602	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C603	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
		C604	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C606	0CH1333K562	0.033UF 50V 10% X7R(X) 1608 R/
		C607	0CH1104K942	0.1UF 50V 80%,-20% Y5V(F) 1608
		C610	0CK105DF56A	1UF 2012 16V 10% R/TP X7R
		C702	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C703	0CK106FF94A	10UF 3225 16V 80%,-20% R/TP
	OR	C704	0CH8107F621	100UF 16V 20% - R/TP
		C704	DCH8107F621	100UF 16V M 6666 R/TP
	OR	C705	0CH8107F621	100UF 16V 20% - R/TP
		C705	DCH8107F621	100UF 16V M 6666 R/TP
		C706	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
	OR	C707	0CH8107F621	100UF 16V 20% - R/TP
		C707	DCH8107F621	100UF 16V M 6666 R/TP
		C708	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
	OR	C709	0CH8107F621	100UF 16V 20% - R/TP
		C709	DCH8107F621	100UF 16V M 6666 R/TP
		C711	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C712	0CH1105F946	1UF 16V 80%,-20% Y5V(F) 2012 R
		C713	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C714	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C715	0CH1223K562	22000PF 50V 10% X7R(X) 1608 R/
		C716	0CK105CC5CA	1UF 1608 6.3V 10% R/TP JB
		C717	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C718	0CH4101K412	100PF 50V 5% NP0 1608 R/TP
		C751	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C752	0CH1102K512	1000PF 50V 10% B(5YP) 1608 R/T
		C753	0CH4100K412	10PF 50V 5% NP0 1608 R/TP
		C754	0CH4100K412	10PF 50V 5% NP0 1608 R/TP
		C901	0CH8226C621	22UF 6.3V 20% - R/TP
	OR	C901	DCH8226C621	22UF MV 6.3V 20% SMD R/TP(SMD)
		C902	0CH8226C621	22UF 6.3V 20% - R/TP
	OR	C902	DCH8226C621	22UF MV 6.3V 20% SMD R/TP(SMD)
		C903	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C904	0CH1332K562	3300PF 50V 10% X7R(X) 1608 R/T
		C951	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R
		C952	0CK106DC66A	10UF 2012 6.3V 20% R/TP X7R

DIODE

	OR	D101	0DD202009FA	DAP202U TP UMT3
		D101	0DSAU00128A	SDS142WA AUK KOREA R/TP SOT-32
	OR	D201	0DD202009FA	DAP202U TP UMT3
		D201	0DSAU00128A	SDS142WA AUK KOREA R/TP SOT-32
	OR	D701	0DR491009AA	RB491D TP ROHM SMD 20V 1A 3A 0
		D701	0DSKE00128A	KDR521T KEC R/TP TSM 25V 1A 3A

FILTER

		L150	6200J000030	MMZ1608Y102C TDK R/TP
		L151	6200J000030	MMZ1608Y102C TDK R/TP
		L352	6200JB8010M	HH-1M1608-121JT CERATECH R/TP
		L354	6200JB8010M	HH-1M1608-121JT CERATECH R/TP
		L601	6200JB8008E	HH-1M2012-221JTA CERATECH R/TP
		L602	6200JB8008E	HH-1M2012-221JTA CERATECH R/TP
		L710	6200JB8010M	HH-1M1608-121JT CERATECH R/TP

IC

		IC101	0ILNRHI021A	HD153722TF HITACHI 100PIN/LQFP
		IC103	0ILNRHI016A	HD74LV2G53AUSE HITACHI SSOP-8P
		IC201	0ILNRJR016A	NJM13403 JRC 14PIN/SSOP R/TP O
		IC211	0ILNRNS013A	DS90LV001TM NATIONAL SEMICONDU
		IC212	0ILNRNS013A	DS90LV001TM NATIONAL SEMICONDU
		IC301	0ILNRHI020A	R8J32005FP HITACHI 256PIN/LQFP
	OR	IC302	0IMMRFU012C	MBM29LV160BE-70TN-KE1 FUJITSU
		IC302	0IMMRFU012D	MBM29LV160BE-70TN-KE1 FUJITSU
	OR	IC302	0IMMRMR019C	MX29LV160ABTC-70G(JR3 F/W 1S)
	OR	IC302	0IMMRMR019D	MX29LV160ABTC-70G (PB-FREE &)
	OR	IC302	0IMMRMR019E	MX29LV160BBTC-70G MACRONIX 48P
	OR	IC302	0IMMRSW018A	SST39VF1601-70-4C-EK SST 48PIN
		IC601	0ILNRMI010B	M63041AFP MITSUBISHI SSOP R/TP
		IC701	0IPMGTR036A	XC6409BV05SR TOREX SEMICONDUCT
		IC702	0ILNRRH032A	BD9703FP-E2 ROHM TO252-5 R/TP

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		IC703	0IPMGTR043A	XCM403AA01SR TOREX SEMICONDUCT
COIL				
	OR	L701	0LCSH00010A	CMI-RP1004-221M SHINHAN R/TP
		L701	0LCTD00008A	SLF10145T-221MR65 TDK R/TP
LED				
		LED953	0DL210009GA	ROHM SML-210FC R/TP GREEN 4
CIRCUIT BOARD ASSEMBLY				
		PBM00	6871H-T48LE	JR4-1 LGE MAIN PWB ASSY
		PBS00	6871H-3601A	USB2.0/1394 BRIDGE BOARD WITH
TRANSISTOR				
	OR	Q201	0TR461739AA	2SC4617 TP ROHM EMT3 - EMT3 3K
		Q201	0TRKE80053A	KTC4075E KEC R/TP ESM 50V 0.15
	OR	Q202	0TR142409AA	2SB1424 TP ROHM KOREA NON MPT3
		Q202	0TRAU80018A	STB1188Y AUK KOREA R/TP SOT-89
	OR	Q203	0TR107009AA	CHIP KRC107S-T1(NG)10-47 TP KE
		Q203	0TRAU80009A	AUK KOREA SRC1207S R/TP SMT3 5
	OR	Q301	0TR107009AA	CHIP KRC107S-T1(NG)10-47 TP KE
		Q301	0TRAU80009A	AUK KOREA SRC1207S R/TP SMT3 5
		Q901	0TRAU80020A	SUR482H AUK KOREA R/TP SOT-353
	OR	Q901	0TRRH80017A	ROHM KOREA UMC5N R/TP UMT .V .
		Q902	0TRAU80019A	SUR522H AUK KOREA R/TP SOT-353
	OR	Q902	0TRRH80009A	ROHM KOREA UMG4N R/TP UMT 50V
	OR	Q950	0TR107009AA	CHIP KRC107S-T1(NG)10-47 TP KE
		Q950	0TRAU80009A	AUK KOREA SRC1207S R/TP SMT3 5
RESISTOR				
		R102	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R103	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R104	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R105	0RH2200C622	220 OHM 1 / 16 W 1608 5.00% D
		R106	0RH6803C622	680K OHM 1 / 16 W 1608 5.00% D
		R107	0RH1202C422	12K OHM 1 / 16 W 1608 1.00% D
		R108	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R109	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R110	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R113	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R152	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R153	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R154	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R155	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R156	0RH2203C622	220K OHM 1 / 16 W 1608 5.00% D
		R160	0RH1000C622	100 OHM 1 / 16 W 1608 5.00% D
		R161	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R201	0RH0682C622	68 OHM 1 / 16 W 1608 5.00% D
		R202	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R203	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R205	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R206	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R207	0RH8200C622	820 OHM 1 / 16 W 1608 5.00% D
		R208	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R209	0RH3301C622	3.3K OHM 1 / 16 W 1608 5.00% D
		R211	0RH1000C622	100 OHM 1 / 16 W 1608 5.00% D
		R212	0RH1000C622	100 OHM 1 / 16 W 1608 5.00% D
		R300	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R302	0RH8200C622	820 OHM 1 / 16 W 1608 5.00% D

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		R303	0RH4701C622	4.7K OHM 1 / 16 W 1608 5.00% D
		R304	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R305	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R306	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R307	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R308	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R309	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R310	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R311	0RH2201C622	2.2K OHM 1 / 16 W 1608 5.00% D
		R312	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R313	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R314	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R315	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R316	0RH8201C622	8.2K OHM 1 / 16 W 1608 5.00% D
		R318	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R319	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R320	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R322	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R323	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R325	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R326	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R327	0RH3902C622	39K OHM 1 / 16 W 1608 5.00% D
		R328	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R329	0RH1803C622	180K OHM 1 / 16 W 1608 5.00% D
		R330	0RH2203C622	220K OHM 1 / 16 W 1608 5.00% D
		R333	0RH1502C622	15K OHM 1 / 16 W 1608 5.00% D
		R334	0RH3301C622	3.3K OHM 1 / 16 W 1608 5.00% D
		R335	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R336	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R337	0RH3301C622	3.3K OHM 1 / 16 W 1608 5.00% D
		R338	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R339	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R340	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R341	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R342	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R343	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R346	0RH2202C622	22K OHM 1 / 16 W 1608 5.00% D
		R347	0RH3902C622	39K OHM 1 / 16 W 1608 5.00% D
		R348	0RH8202C622	82K OHM 1 / 16 W 1608 5.00% D
		R349	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R350	0RH8202C622	82K OHM 1 / 16 W 1608 5.00% D
		R351	0RH2700C622	270 OHM 1 / 16 W 1608 5.00% D
		R352	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R353	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R355	0RH3303C622	330K OHM 1 / 16 W 1608 5.00% D
		R356	0RH3303C622	330K OHM 1 / 16 W 1608 5.00% D
		R357	0RH2702C622	27K OHM 1 / 16 W 1608 5.00% D
		R358	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R359	0RH4701C622	4.7K OHM 1 / 16 W 1608 5.00% D
		R360	0RH1501C622	1.5K OHM 1 / 16 W 1608 5.00% D
		R361	0RH1501C622	1.5K OHM 1 / 16 W 1608 5.00% D
		R362	0RH1501C622	1.5K OHM 1 / 16 W 1608 5.00% D
		R364	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R365	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R366	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R367	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R368	0RH4700C622	470 OHM 1 / 16 W 1608 5.00% D
		R369	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R370	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R374	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R375	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R376	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D

S	AL	LOCA.NO	PART NO(GS)	SPECIFICATION
		R380	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R382	0RH4702C622	47K OHM 1 / 16 W 1608 5.00% D
		R384	0RH8202C622	82K OHM 1 / 16 W 1608 5.00% D
		R387	0RH3901C622	3.9K OHM 1 / 16 W 1608 5.00% D
		R389	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R391	0RH3300C622	330 OHM 1 / 16 W 1608 5.00% D
		R401	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R402	0RH0102C622	10 OHM 1 / 16 W 1608 5.00% D
		R413	0RH1001C622	1K OHM 1 / 16 W 1608 5.00% D
		R604	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R606	0RH1502C622	15K OHM 1 / 16 W 1608 5.00% D
		R609	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R701	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R711	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R716	0RH1001C422	1K OHM 1 / 16 W 1608 1.00% D
		R717	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R801	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R802	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R803	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R804	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R805	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R806	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R807	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R808	0RH0222C622	22 OHM 1 / 16 W 1608 5.00% D
		R809	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R810	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R812	0RH0102C622	10 OHM 1 / 16 W 1608 5.00% D
		R814	0RH0102C622	10 OHM 1 / 16 W 1608 5.00% D
		R815	0RH0822C622	82 OHM 1 / 16 W 1608 5.00% D
		R816	0RH1003C622	100K OHM 1 / 16 W 1608 5.00% D
		R817	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R818	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R819	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R820	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R821	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R822	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R823	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R824	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R825	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R826	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R827	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R828	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R829	0RH1002C622	10K OHM 1 / 16 W 1608 5.00% D
		R901	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R905	0RH3300C622	330 OHM 1 / 16 W 1608 5.00% D
		R906	0RH3300C622	330 OHM 1 / 16 W 1608 5.00% D
		R907	0RH0000C622	0 OHM 1 / 16 W 1608 5.00% D
		R908	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R909	0RH1503C622	150K OHM 1 / 16 W 1608 5.00% D
		R955	0RH1500C622	150 OHM 1 / 16 W 1608 5.00% D
		RA212	0RR0000Q62A	0 OHM 1/16 W 3216 5.00% R/TP 8
		RA801	0RR0822Q62A	82 OHM 1/16 W 3216 5.00% R/TP
		RA802	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
		RA803	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
		RA804	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
		RA805	0RR0332Q62A	33 OHM 1/16 W 3216 5.00% R/TP
SWITCH				
		SW950	558-026I	TACT JTP-1236A JEIL
		SW951	6600HXF102A	MPU20160MLB0 MIC NON DC5V 0.7M